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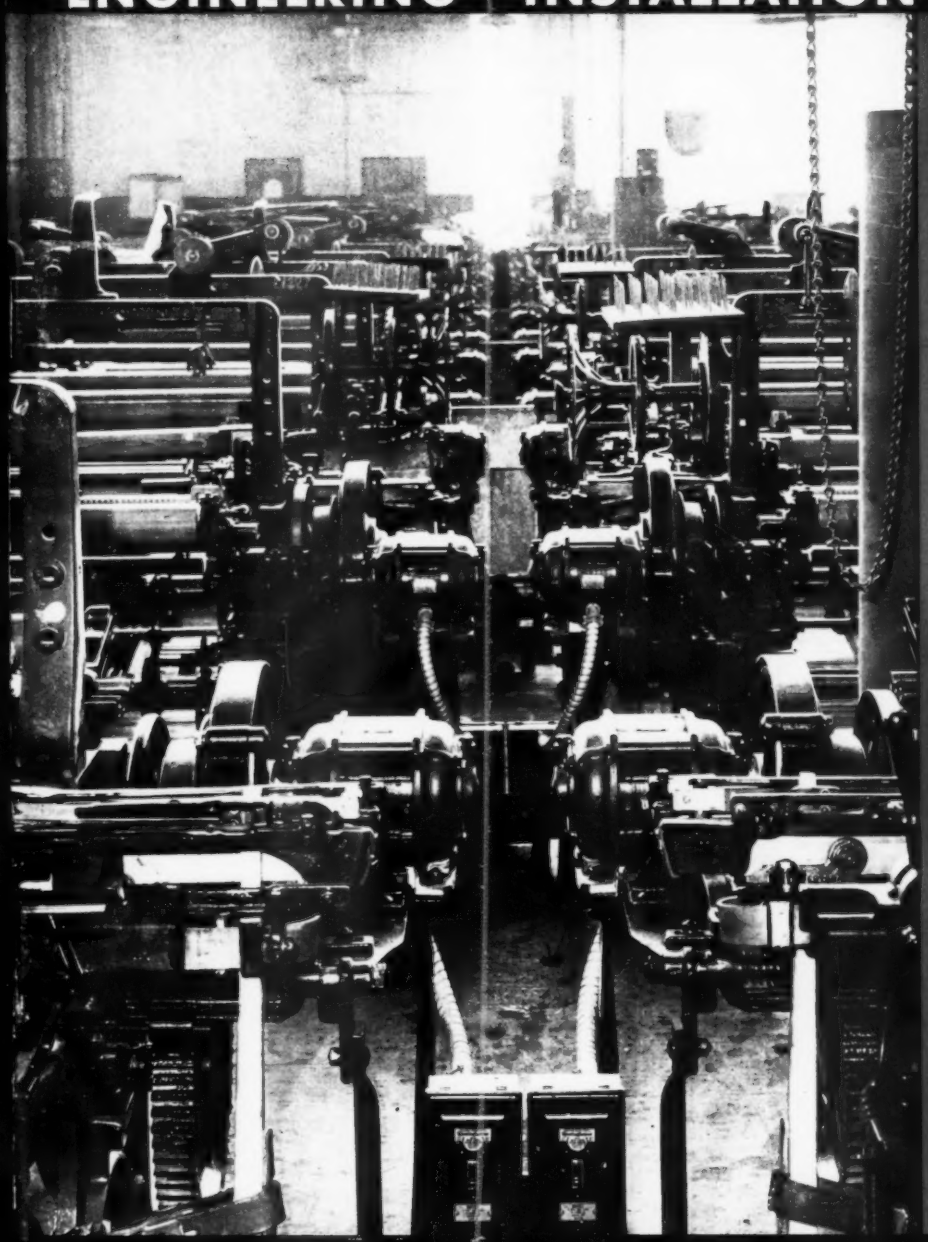
ELECTRICAL CONTRACTING

IN TWO PARTS—PART 1

ENGINEERING • INSTALLATION • MAINTENANCE



Announcing

a new department

Maintenance

which will bring together in one section the various activities formerly carried on in connection with the modernization, repairing and servicing of commercial and industrial wiring, lighting and power equipment.

Electrical Maintenance Keeps Industrial Wheels Turning

UMI

A Pointer
ON G-E TIME SWITCHES

PLUS PROFITS

For extra profits on wiring jobs with time control, use the time switch with plus values —a G-E time switch. Not only will you obtain a large selling profit on *each* switch, but you get additional profits from low wiring costs, negligible selling expense, and low maintenance. Each wiring job will have an extra profit that means money for you. A copy of Bulletin GEA-1427F shows exactly why G-E time switches are *better switches* to sell. Write for a copy. General Electric Company, Schenectady, N. Y.

AND HERE'S YOUR PROOF

EASY WIRING: liberal spacing below the terminals, five convenient knockouts for conduit connection, connecting lugs, easy time setting, simple mounting. These features reduce your wiring time and costs.

EASY SALES: your prospect knows that he can depend on a G-E time switch. The well-known Telechron motor and extra-heavy silver contacts assure him of years of trouble-free service.

LOW MAINTENANCE: there are no maintenance calls to cut into your profits. Once a G-E time switch is wired, you and your customers can forget it.

Use a G-E time switch on your next sign or store-window lighting installation. For further information, see your nearest G-E distributor, or write to General Electric, Schenectady, N. Y.

440-97

GENERAL ELECTRIC

HOWARD EHRLICH
Vice-President

S. B. WILLIAMS
Editor

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Assistant Editor

GLENN SUTTON
Manager

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Established 1901

•

INSTALLATION

ENGINEERING

MAINTENANCE

REPAIRING

MANAGEMENT

MARKETING

for

ELECTRICAL CONTRACTORS

INDUSTRIAL
COMMERCIAL
RESIDENTIAL

ELECTRICAL INSPECTORS

ENGINEERS

SERVICE SHOPS

and others engaged in the business of electrical construction

ELECTRICAL CONTRACTING

With which is consolidated

The Electragist and Electrical Record

Vol. 35 **December, 1936** No. 14

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NO SCRAPING NO RETINNING

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CONDUCTORS

When you work against time — when every hour means a dollar—save *time and money* with U. S. "Cleanstrip" Safecote—the cleanest, fastest-stripping wire on the market—at regular Safecote prices. U. S. "Cleanstrip" eliminates retinning after stripping—no time lost in joining and soldering.

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United States Rubber Company

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EC
DECEMBER 1936

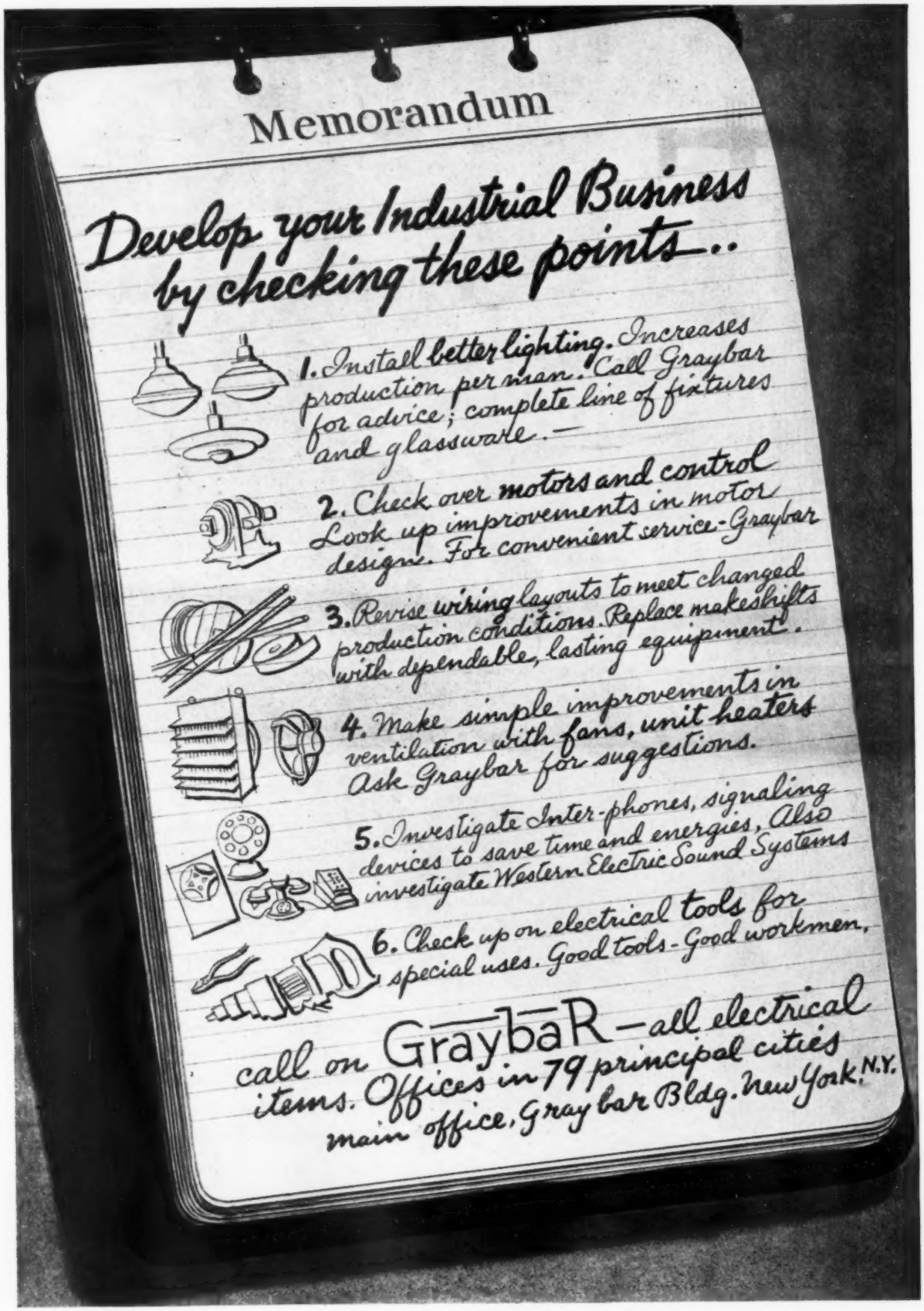
Problems Ahead

AS this year draws to a close, electrical contractors have much to be thankful for. They have enjoyed the best year in many and can look forward to a better volume in 1937. This return of better times has brought with it, however, some problems which will require very careful thinking. Some of these problems are listed here:

Labor shortage
Lengthening material deliveries
State legislation
Meeting the competitive situation
Remanning estimating and engineering staffs
Remanning inspection department staffs
Industry cooperation movement
Building local associations
Selling adequate wiring
Farm wiring
Reinspections
Assimilation of new National Electrical Code

MOST of these, it will be noted, are problems which are best worked out in cooperation with others. For that reason 1937 should be a year of great association activity. Moreover, many of these problems will require cooperation with associations in other branches of the industry. Next year will present the major opportunity of all time for electrical contracting associations, national, state and local, to be of real help to the industry. Let no association be weak for want of something to do, because there are plenty of problems crying for attention.

THESE problems cannot be handled so slowly that big losses are piled up while waiting, nor yet too hastily, because the industry will have a long time to regret any serious mistakes. For that reason, association officers and committees now more than ever should be selected not for their popularity alone, but for their judgment and leadership.


Memorandum
Develop your Industrial Business by checking these points...
1. Install better lighting. Increases production per man. Call Graybar for advice; complete line of fixtures and glassware.
2. Check over motors and control. Look up improvements in motor design. For convenient service - Graybar
3. Revise wiring layouts to meet changed production conditions. Replace makeshifts with dependable, lasting equipment.
4. Make simple improvements in ventilation with fans, unit heaters. Ask Graybar for suggestions.
5. Investigate Inter-phones, signaling devices to save time and energies. Also investigate Western Electric Sound Systems
6. Check up on electrical tools for special uses. Good tools - Good workmen,
call on GraybaR — all electrical items. Offices in 79 principal cities
main office, Graybar Bldg. New York, N.Y.

ELECTRICAL CONTRACTING

Vol. 35 DECEMBER, 1936 No. 14

▲

S. B. Williams, Editor

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FIELD BRIEFS

● A SCHOOL LIGHTING test at Cambridge, Mass., with two carefully balanced groups of children, showed that the group in a well lighted room improved 28 per cent more in reading and 10 per cent more in achievement than the poorly lighted group.

● GREEN COVERED WIRE must be used for grounding the outlets in kitchens, basements, bathrooms, etc., on future wiring installations made in Vancouver, B.C. Presumably this requirement applies to knob-and-tube wiring in order to distinguish the outlet or equipment grounding conductor from the white neutral conductor of the branch circuit.

● ALTHOUGH $69 was the average cost per farm wiring job reported in a recent E.E.I. survey, the Minnesota Electrical Council feels it is conservative in placing the average for that state at $150 per farm with many at $200 to $500 and larger. The Mankato Electric Company, for instance, recently completed the wiring of one farm at a cost of $945.

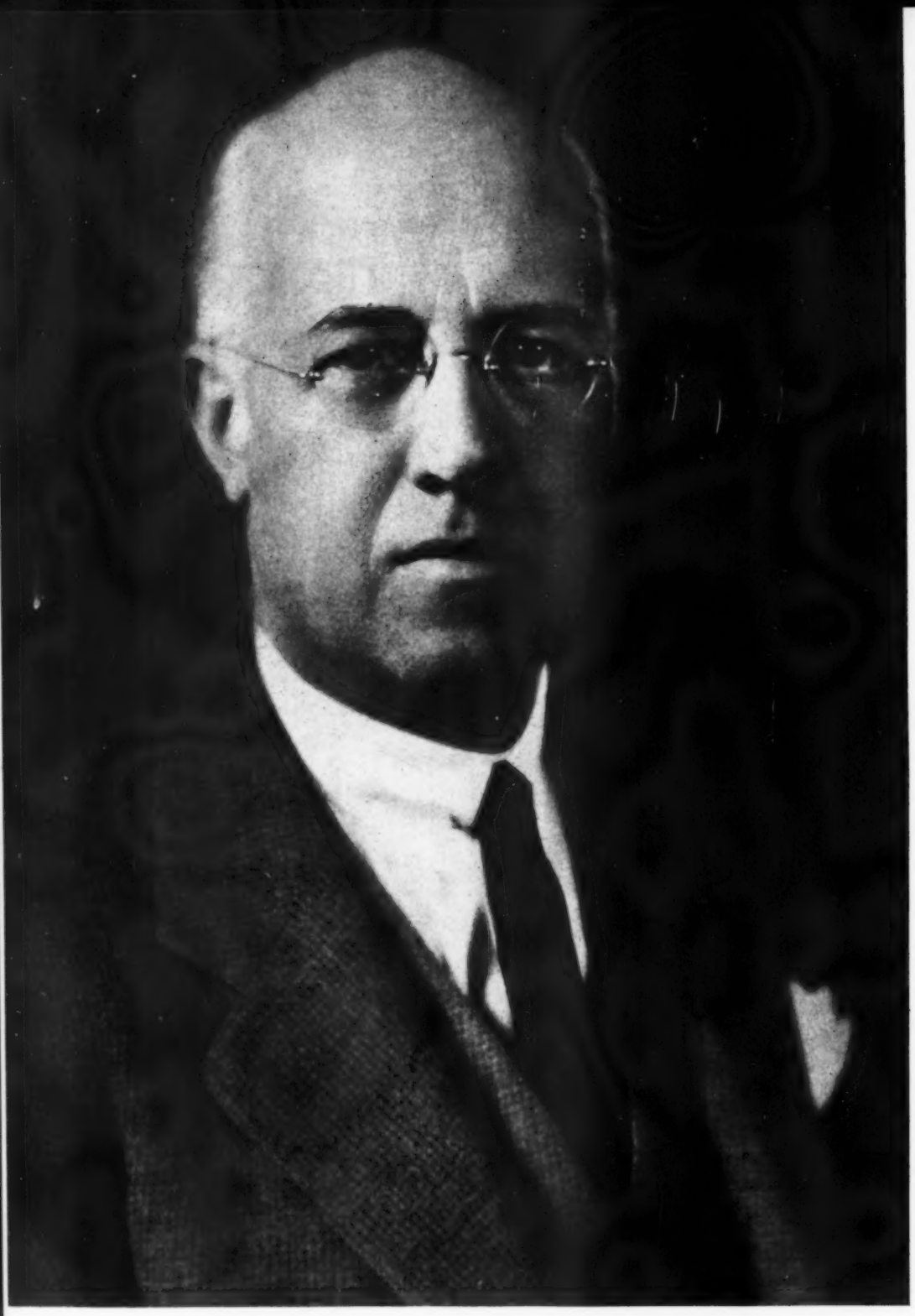
● THE SECOND REA allotment for the financing of farmstead wiring goes to the Meeker Cooperative Light and Power Association of Litchfield, Minn. The sum of $25,000 will be re-lent to cooperative members. Installations will be made on a group basis by independent electrical contractors.

● PUBLIC WORK has approximately one more bidder per job than private work, according to the records of the Local Code Committee for the Electrical Contracting Industry of New York. For the first ten months of this year, 110 jobs of public work were bid on by 516 electrical contractors operating under the Code, an average of 4.69 contractors per job. During the same period, there were 775 jobs of private work with 3017 bids, or an average of 3.89 bids per job.

● TWELVE AND A HALF million kilowatts, approximately equal to the average output of all central stations, was produced by General Electric in man-made lightning. A current of 50,000 amp., the highest ever obtained at high voltage, was reported at five millions volts.

● DIRECT CURRENT potentials of five million volts above ground will be possible of attainment from the electrostatic generator now being built by Westinghouse in an attempt to disintegrate the atom.

● AN ELECTRICAL CONTRACTORS conference covering lighting fundamentals and the newer applications such as mercury vapor and luminous buildings, control, voltage drop, air conditioning control and lighting sales, and lasting over a period of seven weeks, has just been concluded in Cincinnati, O. It was held under the auspices of the electrical contractors division of the Cincinnati Electrical Association.



EARL WHITEHORNE

Earl Whitehorne *Becomes* *Editor of* ELECTRICAL CONTRACTING

READERS of ELECTRICAL CONTRACTING will be interested to hear that Earl Whitehorne has just been appointed editor of this paper. S. B. Williams, who has been the editor since 1924, has been appointed managing editor of *Electrical World*. It gives me great pleasure to announce this important step, in preparation for the expanding part that we believe this publication must play in the service of the contractor and the electrical industry.

Mr. Whitehorne needs no introduction to the electrical contracting field—nor are the problems of the contractor strange to him. Thirty-odd years ago, he entered the electrical industry through the contracting business in Newark, N. J. There, in the Mobile Electric Company, he had his training in blue shirt and overalls. He put in his time at estimating and later handled the business end. He knew those Saturdays of anguish, when you slide belated collections into the bank at 11.55, to meet a hungry payroll.

But he had a yen for writing and an enthusiasm for promoting the electrical idea. So in 1907, when the first publication was launched, devoted to the development of the electrical market, he joined the staff of "Selling Electricity," now *Electrical Merchandising*, and liked it. He continued as managing editor until 1915, when the paper was purchased by the, then, McGraw Publishing Company.

At that time *Electrical World*, recognizing that the "electrical industry" no longer meant just the power company and the engineer, began to take a greater interest in load building and in the affairs of the contractor, the appliance dealer, the jobber and the manufacturer. Mr. Whitehorne became its first commercial editor, and in this capacity, maintained close contact with the national associations and the more progressive personnel of all four branches of the industry. Later, during an emergency in the twenties, he acted for several years as editorial director of *Electrical Merchandising* and *Radio Retailing*. Since then he has continued as associate editor of *Electrical World*.

Throughout this long period, Mr. Whitehorne has traveled the length and depth of the country, attending conventions and visiting electrical men, and by his writing and his speaking has exerted a profound influence upon the development of the electrical market. He has advocated more liberal utility commercial policies and a more tolerant, creative competition in the local marketplace. He has worked for higher service standards in electrical appliances and equipment and more adequate wiring installations. He headed the famous "Industry Conference on Wiring" in 1927 that showed up the fallacy of the controversy then raging over the cost of wiring. He stimulated the establishment of electrical leagues for the practical coordination of the local electrical family in the cities. He was president of the Electrical Association of New York in 1930 when the Modernization of Industry Program was launched. For twelve years he has been the representative of Mr. McGraw in the presentation of the James H. McGraw Award. He has preached the gospel of cooperation without ceasing.

Mr. Whitehorne has been a familiar figure about the industry until the past two years, when ill health has restricted his activity. But I am glad to say he is now restored to his old time vigor and enthusiasm. He takes over ELECTRICAL CONTRACTING with the January issue with the eager conviction that the next important step in the development of electric service to the American people will center in the field of wiring. He brings to this new phase of electrical progress an unusual breadth of background knowledge and a fine instinct for promotion, which we believe will still further advance and vitalize the service of this paper to its readers. And ELECTRICAL CONTRACTING will continue to fight for the best interests of the contractor with the same militant spirit that it has always maintained.

Howard Ehrlich

Vice-President

UMI

Inspection Recovery Still Lags

WHAT has taken place among inspection staffs during the depression, and what is their present condition, in the face of greatly increased electrical construction activity? Are staffs being restored to the point that they have enough help to make thorough inspections of new work and also to make reinspections?

To find an answer to these questions, a recent survey was made by ELECTRICAL CONTRACTING of the inspection departments of thirty-one cities in nineteen states and one Canadian province, with a combined population of 10½ million. All of these cities have populations in excess of 75,000.

These cities are operating today with a reduction in staffs of 21 per cent below the pre-depression level. Only 39 per cent of the men who were laid off have been restored to service. The present staffs must take care of an average population of 53,800 persons per inspector as compared to 43,000 per inspector before the depression. This average covers a population range of from 33,000 per man to a high of 170,000 per man. By disregarding three cities which have populations above 500,000, the remaining twenty-eight cities average 65,000 population per inspector.

Surplus

Ten of the cities reported a surplus of income over costs. These "profits" aggregated $113,939. At the average expense of $2540 per year reported for inspectors employed in these ten cities, this extra income would have employed forty-four additional men or an increase of 40 per cent in man-power. These cities employ one inspector per 65,000 population, as compared with one inspector per 50,000 population before the depression.

More men are needed in twenty-five of the thirty-one cities, of which seventeen reports stress the need for more time to make inspections thoroughly. Approximately half of these reports indicate a demand for more help in making reinspections, while about 60 per cent show that the present staff situation permits little or no time for doing reinspection work. Only such complaints as are made by fire marshals or other "must" sources can be taken care of in some cities, because there are too many regular inspection calls to be made.

An Analysis of Inspection Department Conditions

City	Deputy Inspector Man-Power					Departmental Operations				
	Present Force	Before Depression	Laid Off	Reemployed	Additional Men Needed	Are Reinspections being Made	Population Per Inspector	No. Inspections Per Man		
								1929	Lowest Year	First Half 1936
1	2	6	4	None	3	When possible	150,000	14 per day	14 per day	14 per day
2	3	7	4	None	2	No	125,000	2,762	.....	1,429
3	None	None	.....	.....	1	Yes	80,000	.....	.....	.....
4	4	4	1	1	1	No	39,000	1,600	1,160	1,152
5	None	1	1	None	1	No	85,800	4,896	1,575	1,237
6	4	5	1	None	2	Very little	56,250	3,240	2,057	1,028
7	4	5	1	None	Yes	When work is slack	75,000	16 per day	16 per day	16 per day
8	4	4	1	1	2	Yes	26,750	.....	12,904	7,941
9	None	None	.....	.....	1	When possible	90,000	2,000	900	1,000
10	2	3	1	None	2	Yes	110,000	12 per day	8 per day	14 per day
11	None	1	1	None	2	Some	115,000	10/15 per day	.....	1,500
12	1	1	None	None	No	.....	.....	.....	.....	.....
13	4	4	None	None	No	Yes	3,500	.....	.....	.....
14	3	3	1	1	No	Yes	33,000	1,814	1,889	.....
15	13	18	5	None	Yes	Some	.....	.....	.....	.....
16	35	45	22	12	8	Limited	43,000	3,435	2,827	1,754
17	1	1	None	None	4	No	140,000	.....	.....	2,000
18	4	5	2	1	2	When possible	80,000	1,500	1,200	1,218
19	3	4	1	None	1	Yes	50,000	3,037	2,927	1,407
20	10	11	5	4	2	On complaints	35,500	4,878	4,470	2,675
21	13	13	None	None	4	Yes	46,000	3,766	2,090	1,575
22	4	1	1	4	No	No	130,000	.....	.....	8,280
23	5	8	3	None	2	Yes	120,000	2,650	1,500	1,330
24	17	30	18	5	No	Yes	105,000	17.8 per day	11.7 per day	14.5 per day
25	1	1	1	1	1	Yes	50,000	3,981	1,814	3,845 †
26	5	8	3	None	2	Some	80,000	20 per day	2 per day	15 per day
27	None	1	1	None	2	On complaints	170,000	.....	.....	.....
28	32	32	None	None	No	Yes	37,136	3,068	1,680	1,000
29	None	1	1	None	1	Yes	160,000	12 per day	950	1,500
30	18	18	3	3	5	Some occupancies	40,000	2,555	2,555	1,722
31	None	2	2	None	2	Yes	100,000	.....	.....	.....

Before the depression a production of 2940 inspections per man-year was the average for fifteen cities. For the first six months of 1936, however, the average inspections were 2290 per man or 4580 per man-year. This is an average increase of 63 per cent.

Pay Cuts

These increased demands are imposed upon staffs that are undermanned, and where in many cases salaries have not been restored to the pre-depression levels. The comparative average maximum weekly salaries as reported in thirty cities are: Inspectors, $44.88; electricians, $50.35, and chief inspectors, $51.35.

To attract high-grade inspectors at prevailing wage rates is reported to cause some concern in thirteen of these cities, where a pick-up in work has created a demand for wire-men.

The conditions of employment show that sixteen chief inspectors are subject to civil service, and that in seventeen of the reporting cities the deputy inspectors are working under civil service employment conditions. Of the thirty-one cities reporting, 88 per cent of the inspectors are on civil service, and 12 per cent appointive service. Wage reductions took place among inspectors in 65 per cent of the civil service cities, and in 80 per cent of the appointive service cities.

Before these staffs can undertake regular and detailed reinspection work, they report by a majority of twenty-five to six the need of additional man-power. Some of the cities have cut off auto mileage allowances thus placing further restrictions upon the productive efficiency of the reduced staffs. Where this condition prevails, the request for additional man-power is supplemented by an adjustment for its crippled transportation facilities.

To those who look upon the electrical departments as being engaged solely in making inspections of wiring installations, let it be remembered that other duties, in many instances, are performed by the department heads and one or more assistants. These duties range from maintenance of traffic signals, police and fire alarm systems, and street lighting, to the supervision of electrical work in municipal structures, parks, etc.

In addition, there are days in police court, council meetings to attend, and meetings of examining boards for master electricians, journeymen and moving picture operators. In some instances a certain amount of laboratory test work is carried on. Those cities having a sales control ordinance must provide for the inspection of merchandise that is displayed or offered for sale in stores. Radio interference investigations are also made in some cities, as well as special reports of fires, explosions, and personal injury from shock or burns.

Cooperation Needed

These reports indicate the need for some corrective action in a large number of cities. Inasmuch as good inspection means much to the contractors and other branches of the industry, the inspectors ought to be able to expect their support in securing the money needed.

The industry must demand that all department income be kept available for inspection work. If this does not provide enough funds for a balanced staff, the fee schedules should be analyzed and adjusted to a proper income level.

Covering 31 Cities Having Populations Over 75,000

Annual Expenses	Annual Revenues	Salaries							
		Weekly Inspector Salaries			Electricians		Chief Inspector		
		Min.	Max.	Wage Reductions	Low	High	Annual Salary	Reduction Per Cent	Pay Restored Per Cent
.....	.....	$41.73	$41.73	$10.20	.....	$58.00	.....	.....	.....
$9,780.00	$11,866.05	40.40	40.40	4.60	.....	40.00	$2,280	15⅔	None
.....	4,299.25	.....	46.20	10.38	.....	50.00	2,400	30	18
10,915.74	4,198.77	.....	43.75	.....	$35.00	55.00	2,700	8⅓	all
2,335.93	2,384.20	.....	.....	.....	36.00	40.00	2,800	43	3.6
15,173.00	8,368.75	28.90	32.80	16.3%	.....	34.00	2,008	19	2.7
14,004.91	10,302.66	.....	42.60	9.23	40.00	55.00	2,640	26	.....
12,528.01	.....	.....	34.20	5.07	.....	55.00	2,094	21	8.2
2,700.00	1,980.00	.....	.....	.....	.....	36.00	2,495	20	10
4,876.00	6,865.15	33.00	39.00	35%	40.00	55.00	1,876	18	.....
2,500.00	2,500.00	.....	35.00	3.46	39.60	60.00	1,920	29	5
.....	.....	.....	45.60	5%	.....	44.00	2,371	15	10
.....	2,857.00	35.00	55.00	.....	40.00	55.00	4,250	None	.....
14,600.00	.....	25.20	33.35	10–10%	.....	40.00	2,857	19	.....
.....	4,800.00	.....	57.50	6.90	.....	50.00	3,200	12	All
88,896.46	147,472.15	39.40	46.00	5%	25.00	40.50	3,420	10	5
5,800.00	10,601.18	37.50	45.00	5%	32.50	45.00	2,340	10	5
8,648.75	13,954.57	.....	34.61	.....	35.00	60.00	2,100	.....	.....
7,644.00	6,514.70	.....	38.10	15%	30.00	44.00	3,000	26	All
18,557.93	22,618.93	.....	38.00	9%	.....	50.00	2,700	20	10
48,179.93	15,574.06	.....	46.20	.....	.....	50.00	3,000	45	All
8,887.85	15,003.00	45.00	55.00	5.00	50.00	60.00	2,640	30	24
29,880.00	32,396.00	.....	37.50	3.50	25.00	50.00	2,580	29	All
58,777.41	71,596.00	24.00	56.00	.....	44.00	68.20	3,840	14	10
3,264.00	3,147.20	28.80	34.60	16⅔ to 44%	40.00	50.00	1,800	20	.....
11,000.00	18,060.18	.....	32.30	20%	40.00	50.00	2,400	20	.....
.....	1,060.00	34.60	57.60	15%	.....	45.00	3,000	.....	.....
95,259.42	37,859.65	33.05	45.90	None	.....	55.00	4,000	15	All
2,653.00	.....	.....	46.73	.....	.....	50.00	3,000	20	3
44,080.00	56,775.00	38.50	50.00	None	35.00	66.00	3,200	31	18
.....	.....	.....	50.00	None	.....	.....	2,400	10	All

UMI

QUICK SHAFT BUILD-UP

In building up this shaft on a 25-hp. rotor, two floor type steel yokes were used as "horses". The operator rotates the rotor with his left hand while applying the electrode. The return lead connecting this welding outfit is attached to the yoke which is hidden from view.

WITH bearing trouble representing a major source of motor failures, the J. W. Wilson Motor Service Shop at Macon, Ga., is equipped for speedy workmanship in building up worn motor shafts. Because bearing wear is commonly accompanied by a considerable amount of shaft wear, it becomes a choice between (1) pressing out the worn shaft and replacing it with a new one, (2) cutting the shaft to a smaller diameter to receive new under-size bearings, and deepening the keyway, or (3) building up the worn shaft surface to its former size by the electric welding method.

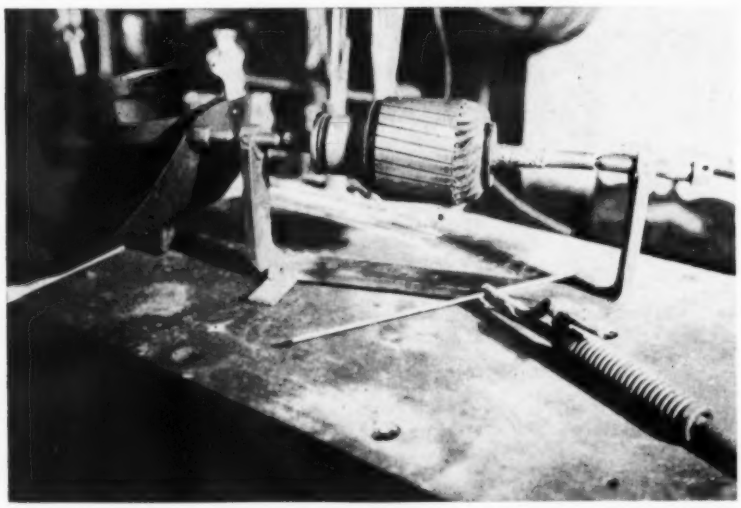
The welding method is followed in most cases because this operation can be done quickly. For small motors such as ½ to 2-hp., the short end of a shaft can be built up in 10 minutes, and the long end in 12 to 15 minutes. The final lathe set-up and machining operation is performed in 10 to 15 minutes. The completed job then accomodates standard bearings as were originally used in the motor.

The shaft replacement method requires an assorted stock of shafts being maintained for rush jobs. It also introduces a risk that good armatures and wound rotors may need rewinding because of the shaft-pressing operation. The time lost while obtaining a new shaft, or while rewinding, is thus eliminated by the welding method.

When a shaft is cut down to a uniform diameter to meet the worn spots, special bearings are needed. It is obvious that new bearings which fit the normal shaft diameter should not be installed on motors in which the bearing surfaces of its shafts have become worn. Shafts worn down more than .002 in. are, therefore, built up to their normal diameter, in the Wilson shop. Disregarding any loss of normal shaft rigidity because of the reduced diameter that results from cutting shafts, the machine work involved must in many cases include the deepening of the shaft keyway.

As practiced in this shop, shaft welding is an important every day operation. Caution is expressed to those who are new in such work, against warping or buckling a shaft. Electrodes are available ranging from 7/32-in. diameter up, with which a close grain weld may be made which has deep penetration characteristics. Shafts that have become worn by loose pulleys are built up without closing up the keyway. A low-current beadweld is made along the opposite edges of the keyway. The rough edges are dressed off by hand with a file after the weld has been machined to shaft diameter. Where special bearings of odd sizes are encountered, they are machined true, after which the shafts are built up to this larger diameter. Should such special bearings be available if the motor is sent to the shop later on, no harm is done, because the weld can be machined at that time to the normal shaft diameter.

Here the welds for an armature from a refrigerator motor have been completed, and are ready for the lathe. The armature supporting and revolving bracket for such small jobs is placed on a steel-top electric welding table that is connected with the welding generator.



A Campaign to Sell Adequate Wiring to Builders

HOW TO interest the builder in providing adequate wiring has long been a distressing problem in the electrical industry for both contractor and utility. A new slant which has made a serious dent in the consciousness of speculative builders was used in a recent campaign in Southern California. Through the Bureau of Radio & Electrical Appliances of San Diego County, over the signature of which the advertising and radio programs were set forth, a series of radio playlets was given under the general title "Scrap Book House". A connected story of a comedy type was built around the home building adventures of Johnny and Mary as typifying so many couples thinking of buying or building a new house. The scrap book idea is popular with those contemplating new homes and the theme was woven around such a home scrap book. Suggestions for the incorporation of various details in the home, particularly electrical facilities and appliances, were woven into the story at most logical intervals.

Homes Listed

At the end of each broadcast, which occurred on Saturdays, a list of homes in San Diego County that had been checked by the Red Seal representative of the San Diego Consolidated Gas & Electric Company and found to be adequately wired was given so that visitors might locate them easily.

In further support of this idea the advertisements on the radio page of the local papers gave a list of new homes opened Sunday so that the hundreds of people who spend their week-ends looking at new homes might visit these with the electrical facilities in mind.

The new slant came in when builders of homes found to their dismay that their prize model homes were turned down because of inadequacy of wiring. These home builders had been previously contacted and were anxious to get the free radio and newspaper publicity. When they found that their homes were inadequate to qualify with the sufficient number of outlets and electrical conveniences to merit the radio and newspaper advertising they became acutely conscious of the electrical part of the home.

Homes that had been certified as adequate were placarded by a large poster. Inside at each electrical outlet a small, three-color card was placed. On the card was the wording "The Door to Cheap Service. Easy to Install. Ask Your Electrician."

THERE'S HELP in THOSE OUTLETS
LOOK at your LIVING ROOM ELECTRICALLY
MORE doorways to cheaper service
BUREAU OF RADIO AND ELECTRICAL APPLIANCES OF SAN DIEGO COUNTY
SCRAPBOOK HOUSE

Dramatizing convenience outlets by means of little "meter-men."

One of the series of ads asking the public to look at the various rooms of their homes electrically. Note how the convenience outlets are emphasized by size and shading in the illustration.

One of the announcements of the radio program on a radio page of the daily paper, giving list of new homes opened Sunday for inspection.

In addition to the advertisements on the radio pages calling attention to the radio program, much larger space was utilized by the Bureau to tell the convenience outlet story. One series directed the reader to "Look at Your Living Room Electrically," or at each of the other rooms in the house. Drawings emphasized the convenience outlets and copy told of the convenience and efficiency of cheap electric service through the electric service outlets.

Another group of advertisements dramatized the outlets themselves as "Meter-men," awaiting a chance to help the home owner. At the bottom

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or top of such ads members of the Electrical Contractors Association of San Diego ran small 1-in, ads. tying in and inviting a call for the installation of more outlets.

The campaign was inaugurated by the Bureau of Radio & Electrical Appliances of San Diego County as the cooperative industry organization because it had been found that appliance sales were running up against the obstacle of inadequate wiring for convenient use in the home.

Although it has been difficult to enumerate actual results, it has been found by contractors generally that the idea of more outlets has been very well sold by the program. Contractors also felt that the Bureau's advertising was a recognition of the need by the industry that it must help to sell more wiring to the public

Small cards like this were placed at each convenience outlet in the homes on display. Large posters of the same design were used in all electrical contractor stores as a window display.

Cuts Small Plant Maintenance Costs 83 Per Cent

ADEQUATELY planned electrical systems are perhaps more vital to small businesses than to large, because the former seldom employ anyone that is familiar in general maintenance. The usual "Topsy-like" growth of small plants is too often accompanied by piecemeal additions in the power and lighting facilities. These conditions exact a heavy toll in last minute maintenance costs and impaired operating efficiency.

An example of how this condition was corrected through a thoughtful rewiring program is that of the Royal bakery plant at Raleigh, N. C. Here McKenzie & Separk, local electrical contractors, have completed a wiring installation that is adequate to take care of the load requirements for further expansion of the plant's capacity.

The changes that were made have reduced former repair and maintenance costs for this bakery from about $60 to less than $10 per month. Further economies, such as energy savings, increased operating efficiency, motion or step-saving, and the elimination of shut-downs cannot be evaluated due to steady additions in machinery and a gradually changing scope of plant operations. Every problem affecting a huge industrial plant was in a smaller way evident in this modest business establishment. Based on a plant survey, the modernization work shown in the table was approved:

Charles P. Separk, McKenzie & Separk, at one of the 24-kw. baking ovens.

Claiming nothing new or original in design or engineering, the fundamentals of adequate layout were sold to the management as representing a sound investment for trouble-free operations. A wiring job of around $3,000 resulted in a plant that totals about 60 hp. motor load, plus two 24-kw. pie and cookie baking ovens.

10-Point Modernization Program

1. Relieved present overloaded mains.
2. Provided for future expansion.
3. Overcame excessive voltage losses.
4. Broke up feeder distribution system into departments.
5. Provided positive and tamper-proof over-current protection for all motors.
6. Isolated electrical heating loads from motor feeders to insure maximum efficiency of baking equipment.
7. Re-located motor and lighting controls to save steps.
8. Interlocked machine controls in sequence order to prevent spillage and jamming of products.
9. Replaced worn or unsuitable wiring devices and materials with heavy-duty types.
10. Set up a program of periodic inspection for all electrical equipment.

Cooperation Brings Exposition Wiring to Contractors

That the industry program of cooperation is working in southern California was given evidence by the fact that the wiring for the recent Electrical Age Exposition, commemorating the bringing of Boulder Dam power to Los Angeles, was done by the Electrical Contractors' Association of Los Angeles, instead of being lumped in with a general decorating contract.

Because of the cooperative nature of the Electrical Development League of Southern California upon the board of which A. L. Stone, president of the Los Angeles Electrical Contractors' Association, is a member, the contractors requested that their members be permitted to put in a joint bid for the electrical facilities for the exposition. This bid proved reasonable and the association did the work.

The Public-Interest Factor in State Electrical Legislation

by F. J. Seiler
Assistant Editor, Electrical Contracting

IS THE public interested in, and does it generally approve of state licensing and inspection? Evidently not, because more than half of our states have been appealed to for state electrical legislation during the past few years, yet there are today but eleven states where any kind of state electrical legislation has been enacted. Only about five of these states have bills which give the public a broad scope of protection. Moreover, the history of past legislative efforts shows that two and three attempts have been made in some states without achieving success. Considering these widespread past efforts on the part of the electrical industry, it is evident that mistakes were made in the public approach, which should be avoided in the future.

Undoubtedly these defeats can be charged to certain groups or interests comprising the general public who opposed these bills. Certainly some bills were submitted before each branch of the industry had become entirely in agreement with them. The fact that a bill has whole hearted industry support, however, is no indication of its passage. An authority in legislative matters recently pointed out that it is not difficult to defeat license or fee legislation when there is a lack of public interest in favor of the bill.

Objectives

To save future time and expense, it then behooves the proponents of state legislation to proceed only after certain major objectives have been definitely reached. First: A bill must be prepared that recognizes the principles of protection to the public as the main reason for any eventual benefit to its industry sponsors. Second: All industry groups should be in agreement with and be represented in framing the bill. Third: The public should be induced to take a part in drafting and proposing the bill for enactment. Any proposed legislation which contains provisions that fall short of these three objectives is vulnerable.

The public is primarily interested in its own protection. Perhaps this explains why about 90 per cent of the defeated bills were those which provided only for contractor licensing. Since these bills offered the public no evidence of a direct benefit, but appeared instead to provide a curb on contractor competition, this lack of acceptance can be accounted for.

An approach to public approval must offer definite benefits that are understandable and that have a dollar-value aspect to the general public. State-wide electrical legislation should, therefore, emphasize those services which the bill will render to the public. Some of these services are listed in the table.

Efforts to promote favorable sentiment toward a bill solely on the basis of industry protection, elimination of undesirable competition, or restriction of others from going in business will prove exceedingly harmful to the cause.

On the other hand, a program of education that gives the public a clear understanding of the bill's objectives will break down opposition. Instead of legislating for selfish purposes, it then becomes evident that here is an effort to protect the public against hazards being created through improperly installed wiring by incompetents, and the use of materials that would threaten the loss of life or property.

With the rapid expansion of rural electrification, a great deal of farm wiring is being installed without inspection. Here then the buyer has no assurance of safety, of proper workmanship, of dependable materials, or that the wiring system can be used for more than a bare minimum amount of electrical service.

Since the suburban and rural users of electricity do not enjoy the inspection benefits already set up for the larger towns and cities, this should be one of the first approaches.

With state-wide inspection districts set up, the small communities can have the same protective service as larger cities. Moreover, smaller

Public Benefits Through State Legislation

- **Inspection to prevent fire hazards and safety hazards.**
- **Regulations to reduce insurance rates.**
- **Contractor licensing to eliminate unqualified persons from poaching on the public.**
- **Workman licensing (if included) to control quality of workmanship and to identify accredited journeymen from "handy men".**
- **Sales control (if included) for regulating the distribution of inferior, inefficient or dangerous equipment.**
- **Uniform legislation to lower the costs of approved materials.**

cities can in some cases economize by consolidating the work of their local inspector with the duties of an entire county. State administration and examination will provide for uniform qualifications of those engaged in electrical work.

To those cities in which inspection service is already operative, a state-wide sales control section will add further protection to city dwellers against unsafe or inferior appliances or equipment.

The cost of carrying contractor licenses in several adjoining municipalities frequently runs up to $1000 more per year. This expense eventually becomes a service charge to the customer. State-wide licensing would permit contractors to operate anywhere within their state with one license at a proportionate saving to the public.

When a legislative program is first initiated, the committee in charge might begin to analyze its logical factors of support and opposition. These are shown on this page.

Promotion

The work of organizing, drafting and promoting a bill is obviously an undertaking that requires a great deal of time and expense on the part of representatives of the industry. Those states which have an active state contractors association and a full-time secretary should be able to organize each county group into a constructive promotional body that can carry its case to the general public. With each member working with local civic leaders and other key men, some semblance of public interest can be aroused. A bill that is drafted fairly leaves nothing to hide from the public when it is invited to sit in during the final preparation.

In order that the public and the proponents of a bill may know what it should cost for administrative purposes, a careful survey must be made. This survey will permit a tentative operating budget being prepared. The license fees and inspection fees may then be determined on a basis that will assure the public that no new taxation will be necessary.

A state-wide survey should be based on: Area of state, total population, population now being served by municipal inspection departments, number of contractors per 1,000,000 population, number of inspection districts, or number of inspectors required on the basis of area or population, approximate revenue from (a) licenses and (b) inspection fees.

Such a survey was recently prepared for one state. The number of contractors per 1,000,000 population was approximated at 310, which was found to be the approximate figure for the State of Washington. The combined average number of contractors per 1,000,000 population for Michigan, Oregon and Washington, for example, is 381. Using the low figure for a population of 2,615,000 showed a probability of 810 contractors. Assuming a license fee of $20 annually for 750 contractors, a total income of $15,000 was estimated to be available for administrative expenses. Assuming a population of 60,000 per inspector, a staff of 37 district inspectors would be needed for the suburban and rural areas of this state. On an area basis of 900 square miles for each inspection district, 45 inspectors would be needed. The number of districts actually established would depend on the inspection fees that were received. As the income warranted it, additional inspectors could be added on the basis of self-supporting areas of operation.

It is doubtful if any state in the union would oppose sound electrical legislation, once the public was completely informed as to its benefits. Yet each year a considerable amount of effort is wasted in certain states for lack of public support. It, therefore, behooves industry committees to take stock of a long-neglected factor, namely public opinion. A state-wide effort to encourage the participation of non-electrical groups in the framing of proposed bills will bring the public's benefits to light. Once these benefits are understood, the enactment of good legislation will be found less difficult to secure.

Factors of Support and Opposition

THOSE who must be looked to for direct support and active effort in selling the public are:

- **All state and local electrical contractor organizations**
- **Power companies**
- **Electrical manufacturers**
- **Electrical wholesalers**
- **Farm mutual insurance companies**
- **Municipal inspection departments, rating bureaus, and the state fire marshal's office**
- **Electrical worker organizations.**

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THOSE who should be consulted, and whose endorsement and assistance will have an important bearing on the possibility of enactment are:

- **Legislative representatives**
- **Safety organizations**
- **Casualty insurance groups**
- **Civic organizations**
- **Farmer organizations**
- **Educational Institutions.**

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THOSE who are most likely to oppose a bill:

- **Real estate groups**
- **Building owners and managers**
- **Industrial plant operators**
- **Retail merchants and non-electrical jobbers**
- **Labor groups that now "poach" on electrical workers**
- **"Jerry" builders.**

OIL FIELD REPAIR DEPOT: One of the large plants specializing in the reconditioning of oil field machinery in the Oklahoma City territory is the Prest Machine Works of Oklahoma City., Okla. After a well is "brought in" the equipment is usually sent to these shops for general overhauling before the next job is started. In the left foreground is a 350-V. d.c. "mud hog" motor rated 400 h.p. for 1 hr., or 275 hp. for 6 hrs. This motor is from a Diesel-Electric drilling and pumping outfit. Note the heavy steel skid for facilitating its being handled by oil field truckers. At the right is a 440-V., 250/85 hp. a.c. slip-ring motor on the common steel base with a pump or "mud hog" unit.

Skeleton House Displays Adequate Wiring

CONTRACTORS of Los Angeles, Cal., staged an unusual display of home wiring at the Electrical Age Exposition held recently in that city to commemorate the bringing of Boulder Dam power to the region. A "House of Electrical Adequacy" was sponsored and financed by the Electrical Contractors Association of Los Angeles, the wiring materials being furnished by a group of manufacturers and distributors, and lumber by cooperating lumber firms.

The house itself consisted of the wooden studding with the wiring materials exposed but with the finish plates or equipment in place. The exterior of the house was done off in wallboard but the interior walls were left open.

It had originally been planned to cover the walls with cellophane through which the wiring could be seen. However, possible fire hazards and objections from the fire department caused the abandonment of this unusual treatment.

Equipment

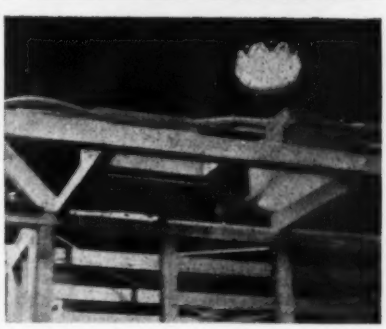
The house was wired in three systems, rigid metal conduit, electric metallic tubing, and flexible metallic conduit, each in different parts of the house. Switches and outlets were mounted in place with the plates on the boxes. Labels affixed to the studding nearby indicated the service which each outlet would perform for the home.

A spectacular and interest-arresting feature was an automatic electric garage door operated by a lock and key from the outside of the house. There were also mounted floodlights for yard lighting, illuminated house numbers, outdoor outlets for Christmas trees or decorative lighting, pushbutton door bell and a porch light all on the exterior with a service entrance and meter on the back of the house.

Inside the house were built-in telephone cabinets, switches, pilot lights, convenience outlets, medicine cabinet with lumiline lamps, electric bathroom heater, a master switch in the bedroom, clock outlets, door chimes, maid's call with a floor tread and a button control, wall type of electric heaters, ventilating fan and plug-in strip in the kitchen, pilot lights on basement light switches, a ceiling fan and a breaker panel. In the kitchen the outlets were marked for their various uses such as refrigerator, range, water heater, dishwasher, garbage disposal unit. On the back porch the outlets for washer and ironer were also marked.

Members of the association were on duty during the entire show in relays to explain and sell the adequate wiring idea to the hundreds who toured through the house every day. Many visitors expressed the thought that this was the first time that wiring had been explained to them and were glad to have an opportunity to know the reasons for the various circuits and conveniences.

The city department of electricity cooperated by displaying in one of the rooms an exhibit of makeshift wiring which had caused fires or accidents, pointing to the need for qualified installations by capable electrical contractors.



1. Front view of House of Adequacy showing automatic garage door opened and yard light above door. Interior construction can be seen through door.

2. Service entrance main disconnect switch and meter socket at back door.

3. Outlets are shown in place with plate. Above each outlet is a card explaining its use. At the left is a panel displaying wiring devices.

4. The wiring method and circuit routing are open to view, thereby removing all of the mystery. This view shows the circuit breaker load center.

5. Method of demonstrating ceiling fan and flush built-in lighting over the sink.

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Variables Affecting Hazardous Wiring Costs

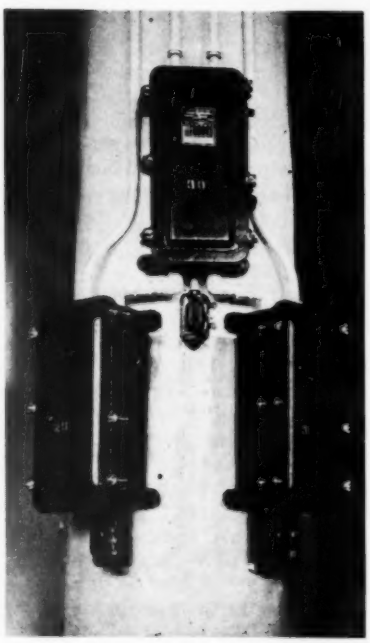
THE difference between the wiring that is usually indicated on plans and the work that must actually be installed is far greater and more expensive in the case of a hazardous location than is the case with the usual run of layouts. This is largely because detailed layouts are rarely made that show all explosion-proof fittings which will be necessary. The fact that such work is commonly done in connection with machinery, tanks, and complicated piping, as in distilleries, paint and varnish plants, and other processing industries makes it easy to overlook items that will cost considerable money in labor and material. Careful estimates are therefore necessary.

Fittings that are easily underestimated are: Sealing fittings, unions and junction boxes. While a floor plan may appear to present a logical wiring arrangement, the final conditions with all machines in place may reveal variations in conduit routings that add footage and fittings. This also means more labor in every case.

Specialists in explosion-proof wiring find it necessary to prepare detail drawings of jobs upon which they are bidding in order to prove the completeness of their layout. These layouts must be given to the wiremen to avoid costly omissions of fittings. It may mean an expensive job, if pipe must be taken down later to add one or more fittings to a run.

Assuming that the contractor anticipates all fittings that are needed for a given job, it then resolves itself to an analysis of actual labor operations that differ from non-hazardous location wiring systems.

The accompanying installation photographs were taken during the wiring of a new varnish manufacturing plant at Newark, N. J., the installation being made by the Edward J. White Company, local electrical contractors.



In the assembly of controller groups, the use of unions for making up odd-shaped runs and connections must be kept in mind.

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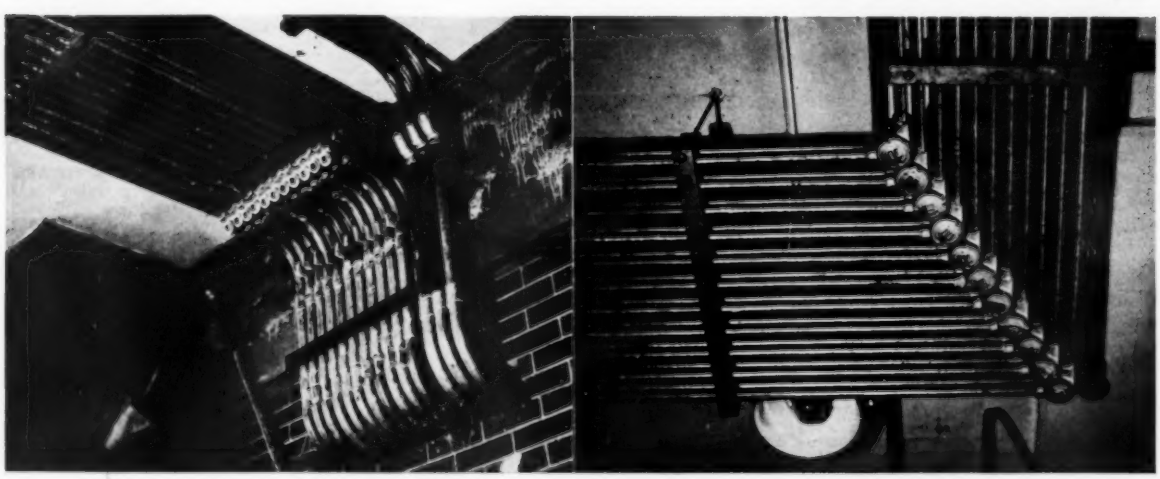
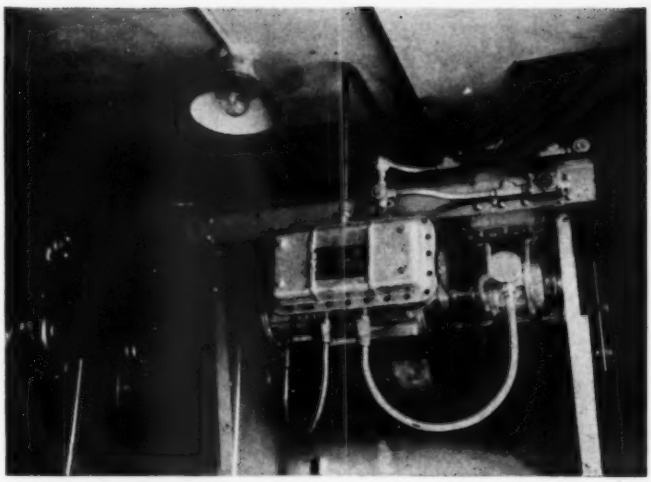
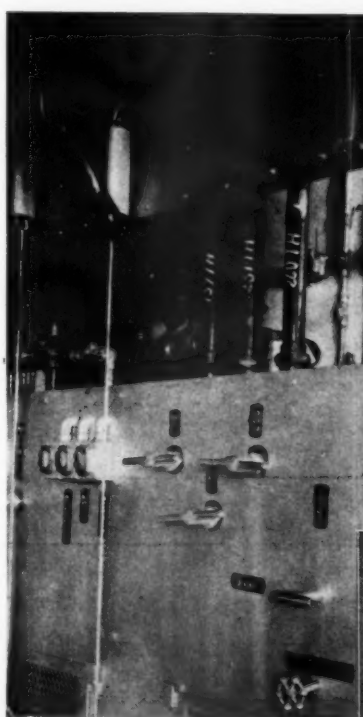
To make up and rack these grouped runs of conduit, considerably more time was taken in aligning the sealing fittings. Here 22 runs of 1-in. and 3 runs of 1¼-in. conduit are sealed near their point of connection to starters that were isolated from a gaseous area. About 20 minutes per fitting was consumed in packing and filling them with sealing compound.

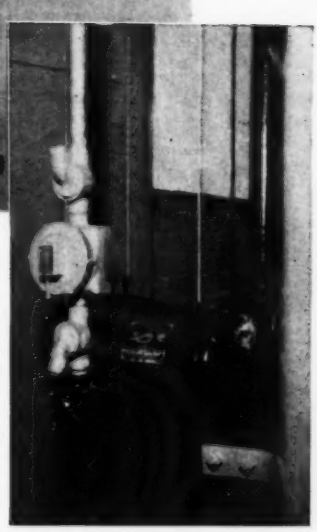
Groups of explosion-proof junction boxes, as in this double-deck run of 1-in. conduit, involve not only the measuring of staggered conduit lengths, but some foresight in assembly to permit the threading up of fittings in a neat looking arrangement.





At small machines like this varnish cooker hoist, there are many fittings to install. Here eight sealing fittings, four junction boxes and several unions are involved.





Plans do not always indicate difficult metal frameworks and congested piping through which several runs must be routed. Extra fittings accumulate quickly at such locations as in this view of a long row of varnish thinning tower control units.

Explosion-Proof-Wiring Labor Variables

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1. The hazardous nature of occupancy suggests greater caution to workmen. More time will be consumed to consult layouts and to avoid hasty or slipshod workmanship.

2. Workmen must select special fittings that suit each condition, and acquaint themselves with their proper positioning. A larger number and variety of such devices must be accounted for.

3. Widely varying types and physical proportions of fittings consume more time in spotting outlet centers, in the preparation of fastening holes in metal or masonry, in obtaining measurements for nipples and lengths of conduit, and in racking conduits.

4. Any shortage of fittings for a particular run will halt work and slow up the progress of the job while a new work-location is established.

5. Changes or unforeseen alterations of layout cause more confusion and lost time. New fitting locations and sealing points may need be established before work can be resumed.

6. Actual operations must be reckoned with also from the standpoint that more fittings in a run mean more cuts and threads per length of conduit. Since estimating opinion differs as to the application of labor units to conduit work, whatever system is used must take this additional number of pipe terminals into consideration.

Sealing fittings are sometimes considered as being needed at only one point in a run, but two or more may be necessary to protect against explosion hazards in special combinations of devices like this 550-volt motor and disconnecting switch.

HOW TO IMPROVE Plans and Specifications*

by William A. Richter

New York, N. Y.

ERRORS of omission, vague and contradictory statements, avoidance of engineering responsibility, and poor design details are considered the four major difficulties which confront the estimator of electrical construction work who must work with the average wiring plan and specification.

To bring about an improvement requires closer cooperation between engineers and contractors. More time should be allotted in figuring jobs and locating items that need to be corrected or clarified, and finally, the consulting engineer should have someone that has not helped make his electrical layout figure it or check it for mistakes before it is placed on the bidding market. According to Mr. Richter, there are four principal weaknesses in the average plan and specification.

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First: Important job information is often omitted although the engineer has full knowledge of it, or can easily obtain it from the architect or from the owner. Some of the principal omissions are:

(a) Definitions of types of building construction.

(b) Elevation or sectional detail drawings of the structure.

(c) Riser plans not giving floor heights.

(d) Outside work referred to but not on a scale plan.

(e) Contour plans for estimating excavation work comprising interconnections to a group of buildings. Type of soil conditions.

(f) Service entrance and ground connection locations.

(g) Measurements to service poles, either horizontal distances or total conductor length.

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Second: There are some statements which leave doubt or which contradict other sections of a specification, such as:

(a) Kind of branch circuits required. It should be stated whether 2-wire circuits may be combined into 3-wire, and with what limitations.

(b) Special conductor sizes for branch circuits. If larger wire is required for long runs the increased size requirements should be defined by schedule and preferably indicated on wiring plans. For instance, where shall the larger wire be terminated? Must switch legs and outlet tap-offs within the larger conductor area also be of that large size? If the specification requires larger wire to the load center of each branch circuit, who is to determine the outlet that is the true load center? With the heavy loads encountered in modern lighting practice, long runs often require No. 6 branch circuit conductors, therefore the foregoing questions have considerable bearing on the layout to be estimated.

(c) Fixture outlets. Whether the electrical contractor shall splice out the conductors in all fixture outlets in readiness for the lighting fixture contractor should be stated.

(d) Directory charts. Will a typed listing of area control suffice, or must a small-scale floor diagram of the completed system be prepared for each panelboard? This item represents a wide difference in cost between these two methods.

(e) Lead sheathed conductors. Unless specifically called for, estimators who do not have architectural details are not able to determine those runs for which lead sheathed conductors are required.

(f) Motor switches. References to specifications of other crafts are often made for determining which motors must be provided with switches under the wiring contract. Contractors must gamble on this item unless there is sufficient time to review the other specifications.

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Third: Engineered layouts are assumed to carry the engineer's full responsibility for a correct electrical job. It should not be necessary for the estimator to follow a prescribed layout while also visualizing his own alternative layout as a check against its correctness. Some of the usual difficulties encountered under this category involve:

(a) Differences in the scope of work to be included. For example: The deadline between utility and contractor work, or between owner and other sub-contractor work, or between building owner and tenant work.

(b) Unusual designs which are not explained. Special conditions that appear to be errors could be explained in the specification and thus save conjecture on behalf of estimators. Unless advised of special future provisions or special rulings on a type of wiring, the estimator must take the time to check it up.

(c) Time factor. The engineer is in a position to aid in securing sufficient time for careful estimating, and in granting extensions of time where changes or correction bulletins must be broadcast.

(d) Errors of layout. Estimators can be expected to catch obvious errors, but cannot make complete job re-checks of every layout detail as a responsibility of bidding.

* Abstracted from an address before the Association of Electrical Construction Engineers of New York.

Fourth: The preparation of details that most accurately clarify an installation depends largely upon the complexity of each layout. Wherever possible the following items deserve first consideration:

(a) Symbols. Conventional symbols should be followed, with a supplementary list of such other outlets beyond their scope.

(b) Full details can nearly always be had from the power company to cover the service equipment layout that will best suit the load and space conditions.

(c) Spaces for switchboards and large panelboards must be planned liberally and details prepared when other equipment is to be avoided with large groups of raceways. Special pull boxes should be worked out carefully.

(d) Home runs are often shown connected to illogical outlets on the wiring plans. Unless a specific statement is made to that effect, estimators are likely to re-route their runs for most direct and shortest possible footages of material.

General Comment

The specification bulk can be greatly reduced if engineers will omit lengthy references to manufacturing and testing standards for wire, conduit and other standard products. Short references to the specific makes and grades that are acceptable will thus release many specification pages for use in providing other useful information about the job. Elaborate details that are in many cases copied from stock drawings or from the work or other crafts may crowd out sketches needed to clarify complicated parts of the electrical job. The estimator needs facts about the sizes of wire, conduit, motors, and other elements that are specified as parts of an electrical system.

Winning Residence Wiring Customers

Joseph H. McNeil and Joseph H., Jr.

WHAT may seem to be minor details in the minds of some are important house wiring job-getters with the Whitney-McNeil Electric Company of Augusta, Ga. So much residence work goes cheap and is done by starvation competition, merely because certain extra touches are not emphasized by the established contractors to set them apart from this element. There are not a few builders of homes who buy quality wiring jobs from this pioneer contracting organization. Each job receives a careful going over to see that all possible wiring convenience is provided during construction.

For instance, each of the last twenty homes that was wired by this company has a radio outlet. One home that is being built for a colored lady has three of them.

Homes being more compact, thus utilizing all possible wall space, much is gained in good will by this company by providing flush bells and service equipment. Although neither of these items is costly, their additional cost is offset by greater ease in selling the job against cheap competition. The placing of outlets where they will be available for greater use, and the checking of correct heights for wall bracket outlets makes friends for the McNeils from one job to another. Just recently a police officer moved in his new home, and because the job was right, everything in logical order, he has made favorable recommendations to fellow officers who plan to build.

This company's lighting fixture department plays an important part in winning house wiring customers. With a modern selection on display, both Joseph H. McNeil and his son, J. H., Jr., begin working on prospective builders of homes early in the game to sell the thought of planning the wiring and the lighting scheme as a coordinated activity. New ideas can seldom be introduced, in the opinion of these men, as a last-minute venture. Getting in with suggestions beforehand encourages visits to the fixture display rooms. Such visits provide an opportunity to develop a close tie of confidence with builders, architects and owners that spells the answer to many cases which would otherwise be plain low-dollar wiring jobs.

FOR speeding up "wee hour" and holiday breakdown service, the Pacific Electric Motor Co. of Oakland, Calif., has prepared a neatly printed hang-up card giving its customers the emergency telephone numbers of ten members of that organization. The card measures 3½ in. by 6 in. and is printed in two colors on a yellow background.

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Construction . . Methods . . . .

Extra Support for Long-Stem Fixtures

An installation of 500-watt vapor-proof reflectors in a foundry that was recently wired by the Terrell

Electric Company at Chattanooga, Tenn., employed hanger stems averaging around 25 ft. of ½-in. conduit. Because of the excessive length and weight of stems, the hazard from possible breakage through swaying, backing off and normal vibration caused the addition of special flat iron saddles to support these stems directly above the reflector hood. The conduit stem was bolted against these saddles with U-bolts.

Quick Cable Measurement

Lengths of heavy wire, armored cable and flexible steel conduit are quickly measured for sending out on jobs by means of check lines and footages that are stencilled on the floor in the stockroom aisle of W. H. Jenks, Richmond, Va. The floor is marked off at 10-ft. intervals up to 50 ft., then at 65 ft. and 75 ft. These floor measurements eliminate looking around for a tape measure or 6-ft. rule, and the time that is required to make the actual measurement. Possible mistakes in measurement are also eliminated by this arrangement.

Ply-Wood Panels for Blue Prints

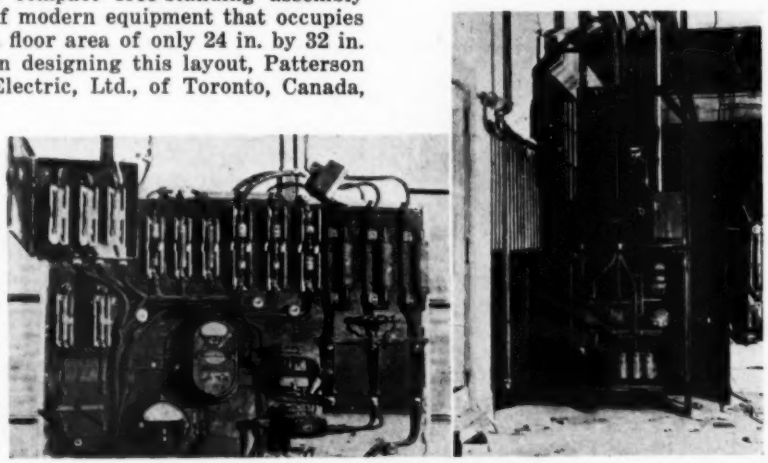
There are no wrinkled, torn and obliterated blue prints to work with on jobs done by the Uihlein Electric Company of Milwaukee, Wis. Each sheet of the electrical drawings for a job is glued evenly on its own plywood panel. For jobs where no changes are likely to be made, the glued-on sheets are covered with a heavy coat of clear shellac. On jobs where the foreman will need to make notes or fill in pencil or crayon lines, the shellac is omitted.

Panels of 3-ply wood are used, cut slightly larger than the overall dimensions of the blue print. Thus the three to four-inch margin or border of bare wood receives most of the soil or smudge from handling these panels, while the drawing remains reasonably legible. The photograph shows Robert Lambert, fore-

man on the local Scottish Rite Cathedral remodelling job, studying one sheet of his job drawings that has been placed flat upon an unruly set of general plans. Other panel-mounted sheets of electrical drawings are stacked edgewise beside the drafting board.

Space Saving Modernization

A power service that was installed in 1913 was recently replaced to provide adequately for a connected load of 110 hp. and to allow an additional capacity of 270 hp. The obsolete open switches, fuses and wiring were replaced with a compact free-standing assembly of modern equipment that occupies a floor area of only 24 in. by 32 in. In designing this layout, Patterson Electric, Ltd., of Toronto, Canada, erected a steel frame which supported the 400-amp. main switch and metering cabinet on one side, and a 10-circuit dead front power distribution panelboard on the rear side of the frame. With this back-to-back arrangement, the main bus-

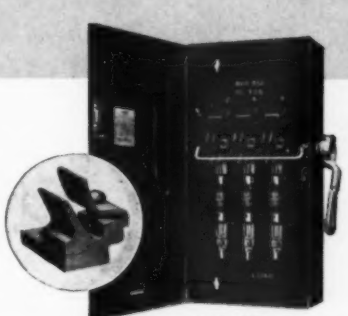


"Before" and "Modernized" Views

FROM CUTLER-HAMMER TO YOU!

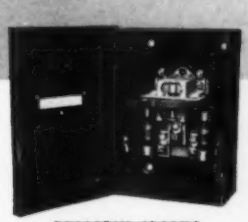
During the 12 months just ending, Cutler-Hammer brought out development after development . . . service and safety switches which performed new functions, provided new conveniences, set new standards of operation and dependability. Such leadership in anticipating the ever rising demand for improved modern apparatus has resulted in an unprecedented demand for Cutler-Hammer merchandise.

The most important of these achievements are pictured here below. And the year 1937 will witness many more Cutler-Hammer developments, equally important, equally advanced . . . equal to any demand of the market. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus*, 1306 St. Paul Avenue, Milwaukee, Wisconsin.



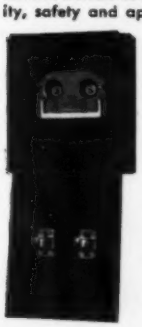
BULLETIN 4101
The Current Breaker
Standing alone as a safety switch for mill duty, the Current Breaker was further improved by the addition of a very practical clamping fuse clip.

BULLETIN 4142H1
Water Heater Switch
Set new standards of reliability, safety and appearance.



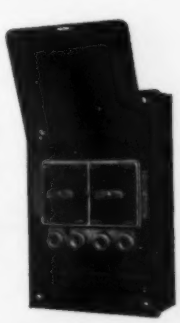
BULLETIN 4140H6
Front-operated "Home Duty" Switch
Notable for the simplicity of its construction—works "almost without works."

BULLETIN 4142H2
Water Heater Switch
Really combines 2 switches in one, saving space, installation costs and labor.



BULLETIN 4331H2 and H7
Front-operated Entrance Switch
These two front-operated switches also simplify installation to an astonishing degree . . . particularly for multiple installations.

BULLETIN 4334H1S
Range Switch
Startling superiorities such as: "works" come out easily; 4 branch circuits; bus tap for distribution line; non-interchangeable main and range-switch pull-outs; etc., etc., etc.



NOW WATCH CUTLER-HAMMER IN 1937

We appreciate this contractor's sublime faith in the full yardage and tensile strength of Slipknot Tape.

Since 1896, Plymouth products have been the favorite of contractors everywhere for one reason—OUTSTANDING QUALITY

SLIPKNOT TAPE
P. R. SPLICING COMPOUND

PLYMOUTH RUBBER COMPANY, INC.

Largest Rubberizers of Cloth in the World

CANTON MASSACHUSETTS

bars of the panelboard were extended into the metering cabinet. The new 3-in. service conduit which contains three 500,000-cm. cables enters the top of the main switch, while the branch power circuit conduits were extended away from the power panel at the rear of frame without interference from the large service conduit. Because of the extra capacity provided for, the power panelboard contains four blank sections that will accommodate 30 to 100-amp. future circuits. This modernization work took place in a Canadian rolling mill and wire drawing plant for precious metals.

Pre-Set Pull Box Supports

To allow completing the installation of a maximum amount of long conduit runs between an air conditioning machinery switchboard and outlying points, the Electrical Engineering and Repair Company, Inc., of Atlanta, Ga., installed the overhead pull box before several special

motor controlling switchboard panels were due to be delivered. Pipe standards of 2-in. conduit, with floor flanges at both ends were set at the end of an 18-in. square, 21-ft. long pull box. Various conduits could thus be run from the box without overhead box hanger rods or wall supporting brackets being in the way.

Top-of-Roof Floodlight Standards

Rigidly mounted standards were provided to support several pairs of 1000 watt floodlights that were mounted above the roof-line of the club house at the Moline, Ill., munici-

The Vice-President of Bull Dog Electric Products Wrote This Ad

OFFICE MEMO

BULL DOG ELECTRIC PRODUCTS CO.
DETROIT, MICHIGAN

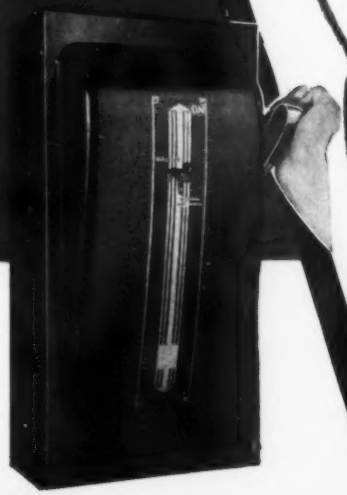
Office of Wm. H. Frank, Vice President

TO E. R. D.

Let's prepare a message to the trade expressing our Sincere Best Wishes for a Merry Christmas and a Very Prosperous New Year -- also express our appreciation for the cooperation they have given. You might mention, incidentally, how exceptionally good the sales of Vacu-Break Safety Switches, Switch Centers, Lighting Panels, Trol-E-Duct and BUStribution have been in 1936 -- how our factory is working with increased personnel and facilities to keep production in line with the demand.

It certainly is gratifying to know that users of electrical equipment appreciate the advanced design and extra quality we are building into our products.

Sounds Good to Me — let's run it just as is.
E.R.D.



Specify BULL DOG to your Electrical Supplier

Fuses

MADE TO PROTECT

"Cured Shutdown Trouble on our Electric Welders"

Says... **Mr. R. C. Bloomfield, Electrician of International Chain & Mfg. Company, York, Pa.**

THE FACTS— "Trying to hold the circuits on our electric welders was a bad job. Fuses kept blowing. Then a salesman told us about BUSS Super-Lag fuses. We tried them—they cured our shutdown troubles."

BUSS

• • NOT TO BLOW!

YOU TOO, *can cure* SHUT-DOWN TROUBLES *caused by* NEEDLESS BLOWS!

Executives, busy with the details of plant operation, sometimes overlook an obvious fact:—a fuse is not a single-purpose device, like wiring or water pipe—it is a TWO-PURPOSE device. It must carry *forever* all safe currents but it must interrupt quickly any dangerous current. Hence, design and construction play a major part in whether or not a fuse will operate properly.

These facts are obvious. Isn't it equally obvious to men interested in plant operation that a fuse that permits needless blows is wasteful and costly? Therefore, why not find out for yourself. . . .

WHY BUSS FUSES DON'T BLOW NEEDLESSLY

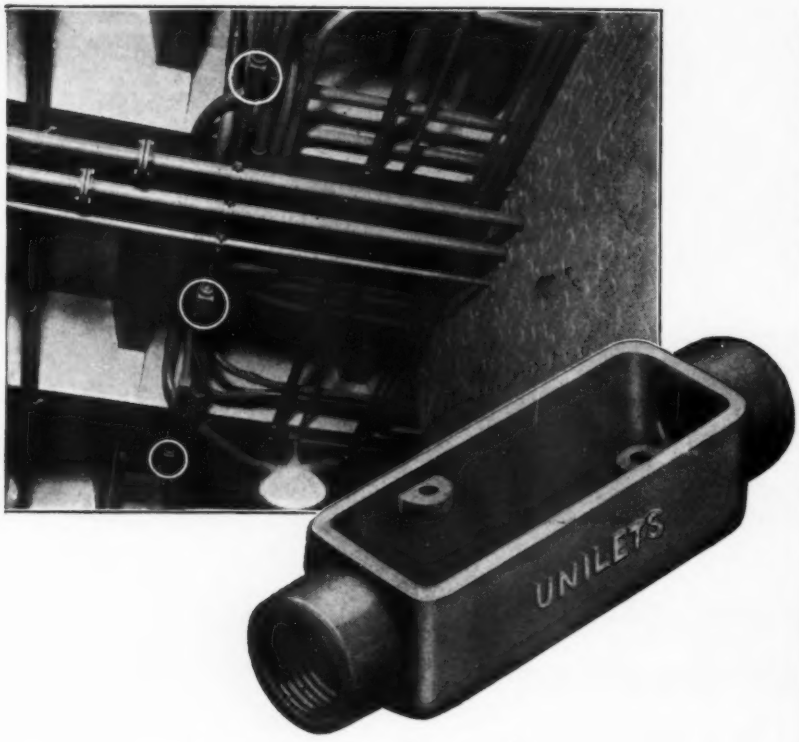
10 FEATURES in the design of the FUSE-CASE help make it possible . . . . *and* *The* **SUPER-LAG** development in the FUSE-LINK completes the job.

Super-lag FUSES

GET THE FACTS *ABOUT...*

- Fuse-case design and what it means in abolishing needless blowing of fuses.
- Time-lag, a key to shutdown prevention.
- The Super-Lag development and how it increases safety on short circuit blows. . . . and many other interesting and valuable facts about fuses and their use.
- All set forth in easy-to-grasp style in the new BUSS book on "Fuses made to protect—not to blow."
- Your name and address will bring your copy by return mail.

BUSSMANN MFG. CO.
University at Jefferson
St. Louis, Mo.
Division of McGraw Electric Co.



For **DURABILITY** Specify—

APPLETON MALLEABLE UNILETS

• In every installation where long life is a factor, Appleton Threaded Malleable Unilets prove their superiority. Malleable iron construction gives them greater strength, yet they are light in weight. The cadmium finish assures positive resistance to rust and corrosion.

The durability of Appleton Threaded Malleable Unilets insures a lifetime of satisfactory service.

Sold Through Wholesalers

APPLETON ELECTRIC COMPANY

1704 Wellington Avenue Chicago, U. S. A.

New York—76 Ninth Avenue
San Francisco—655 Minna St.
Los Angeles—340 Azusa Street
Detroit—7621 Woodward Ave.
St. Louis—420 Frisco Building
Atlanta—540 Marietta St., N. W.

TYPE "C"
Malleable Unilet with Cadmium Finish

TYPE "E"
Malleable Unilet with Cadmium Finish

TYPE "LB"
Malleable Unilet with Cadmium Finish

TYPE "T"
Malleable Unilet with Cadmium Finish

APPLETON

Threaded Malleable

Standard for Better Wiring

UNILETS

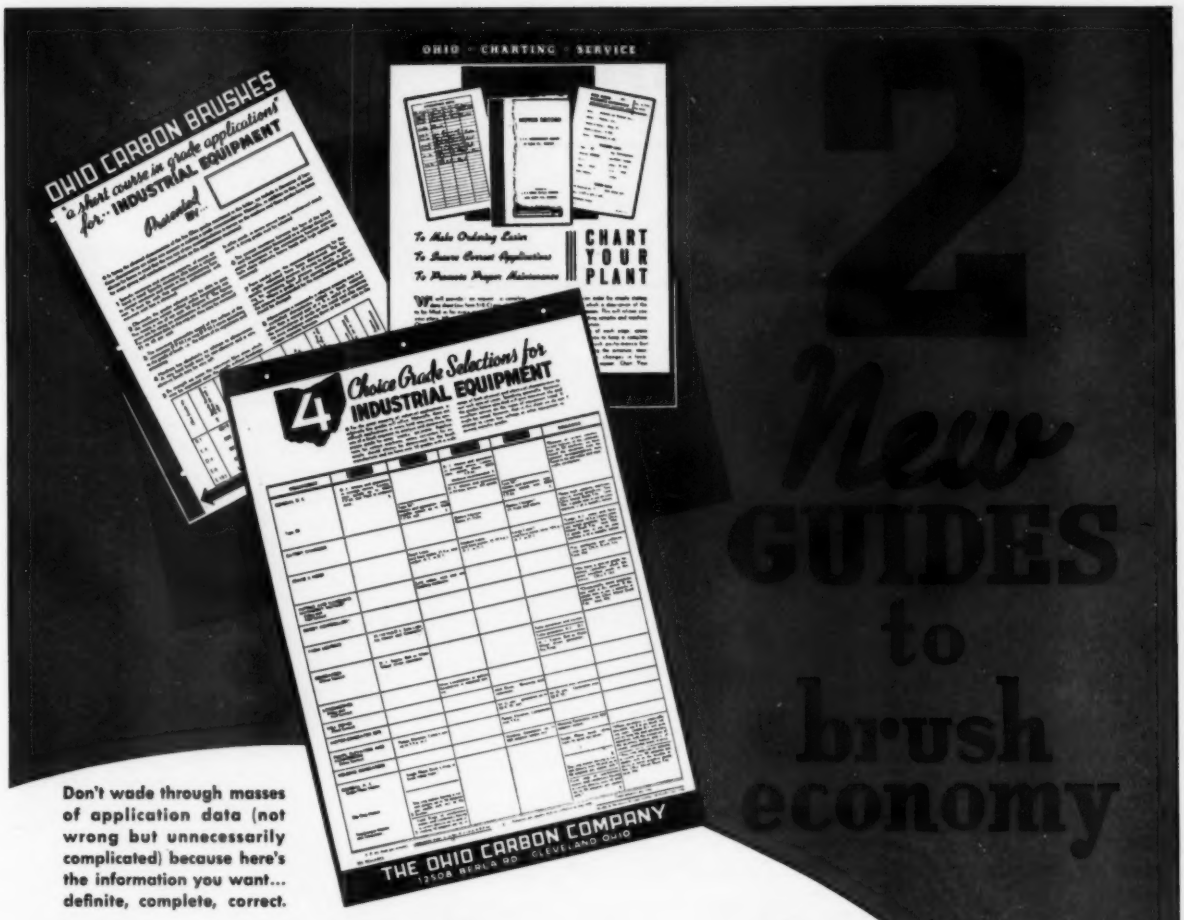
Reg. U. S. Pat. Off.

pal swimming pool. The main support was made of 2½-in. galvanized pipe. This pipe was secured at its bottom end to the face of the building without requiring fastening materials upon the roof. A standard pipe flashing seals the roof opening. A two-piece switchboard fitting was used beneath the eave, and a 5-in. by 8-in. galvanized steel plate at the bottom end of the pipe. To this plate

was welded an ear or lug which fitted into the bottom end of the 2½-in. pipe acting as a support. The center of the supporting lug was tapped to receive a ½-in. conduit nipple. This assembling method took all strain from the conduit connection, seen just below the plate. The installation was made by Leithner & Weishar of Moline and Rock Island, Ill.

Manhole Inserts for Pulling Tackle

The installation of cast-in-place U-bolts at several places in the walls and ceiling slabs of manholes saves time in arranging tackle and snatch-blocks for pulling heavy underground feeders. In a recent installation for a paint factory, the Edward J. White Company, Newark, N. J., placed from three to six U-bolts in each of six manholes when the concrete forms were ready to be poured. These U-bolts were made from ⅝-in. rod and had steel keeper plates on the ends that were cast in place. About six inches of the U-bolt was left projecting through the form as a convenient and solid means of hooking on heavy pulling tackle inside the completed manhole. The locations for these inserts were determined according to the directions that various groups of ducts radiated from the manhole.


OHIO · CHARTING · SERVICE
OHIO CARBON BRUSHES
"a short course in grade applications for.. INDUSTRIAL EQUIPMENT
Presented by...
To Make Ordering Easier
To Insure Correct Applications
To Promote Proper Maintenance
CHART YOUR PLANT
4 Choice Grade Selections for INDUSTRIAL EQUIPMENT
THE OHIO CARBON COMPANY
12508 BEREA RD. CLEVELAND OHIO
2 New GUIDES to brush economy

Don't wade through masses of application data (not wrong but unnecessarily complicated) because here's the information you want... definite, complete, correct.

Grade Selections Simplified

Though it's heresy to say so, relatively few grades of brush material are actually necessary for practically all industrial motor and generator equipment. A recent check of application records proves that in spite of the many grades manufactured, *four* in the non-metal group and *six* in the metal group will take care of most industrial and commercial machines. Further, the non-metals are used five times as frequently as the metals.

In other words, these few grades give the greatest satisfaction on the greatest number of machines and this coupled with the fact that size variations in brushes are not as great as generally supposed, leads to the conclusion that brushes can be purchased economically and without any sacrifice of true quality. • With the aid of the charts shown above and our stock list of popular industrial sizes, you can easily determine the proper inventory proportions suitable to your business.

Ask for copies of forms 793 and 794

NO OBLIGATION IS ATTACHED TO YOUR REQUESTS FOR THESE CHARTS. ADDRESS→

THE OHIO CARBON COMPANY
12508 BEREA ROAD.
CLEVELAND, OHIO. U.S.A.

UMI

Service Shop . . . Practice . . . . .

Odd-Purpose Pliers

For doing a variety of light repairs on appliances, small motors, fans, starters, signs, time switches, and the like, the Jordan Electric Company, Columbia, S. C., provides pliers to make those hard-to-grab

nuts, springs and washers easier to handle. Racked along the bench backboard in tin retaining clips or straps, there is no time lost in fumbling through tool drawers for the right type of plier. There are round-nose, square pointed-nose, short side-cutting and right-angle fluted-nose tools in the collection and they are said to come in mighty handy for the repair mechanic.

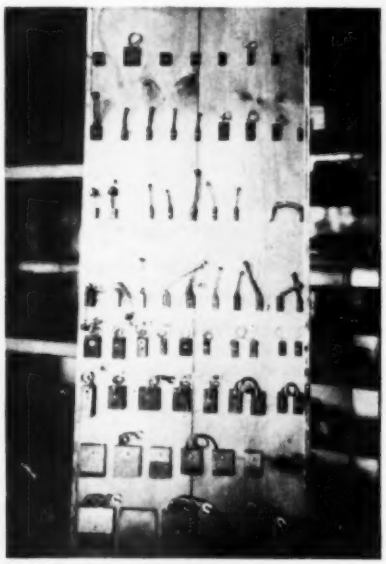
Exact-Fit Bearing Mandrels

To save time and to minimize buckling or distortion during the installation of new sleeve bearings, the

A. C. Motor Service Company of Jersey City, N. J., designed a 3-ton arbor press equipped with separate mandrels and stop collars to fit fourteen popular sizes. Each mandrel has a long shank that fits into the hollow thrust screw, while its opposite end is turned to fit the internal diameter of a certain size of bearing. A stop collar or shoulder was left on the mandrel to limit the length within a sleeve. Distortion of end-frames from pressure applied is prevented by seating the bearing hub upon one of the various sizes of bedplate stop collars. These were machined to fit telescopically to form units of as small bore as desired.

Quick Brush Selection

Brush purchasers often consume valuable time in busy service shops.



Therefore, the Eifler Electric Company, Inc., Union City, N. J., arranged about 150 specimens on a 6-ft., 6-in. by 18-in. sample board to speed up customer service. It was given a natural wood finish, and bordered all around with ¾-in. nickel-plated angle. This panel is thus rigidly constructed yet more or less portable to permit placing it wherever the changeable arrangement of other display equipment dictates. Having been just recently completed, the items on this board are being labeled with key numbers corresponding with drawer or bin numbers in the small parts stockroom.

Narrow Shop Wall Storage

With a shop space measuring only 8½-ft. wide, the H. J. Electric Company, Inc., New York, N. Y., provides storage space along the wall opposite its work benches and machines by means of a 40-ft. assembly of sectional steel shelving. Space being at a premium, this type of equipment was chosen as offering a maximum amount of usable shelf area plus the further advantage of its being adjustable to suit changed

requirements in the upper shelf spacings.

Short Forms for Specialty Service Records

To expedite the handling of forty to fifty service orders per day during the heating season, a set of condensed job record and work order forms was developed by the Brunswick Electric Company of Chicago, Ill. This company specializes in the installation and maintenance of stokers, ventilation units, and air conditioning equipment. Over 7,000 service calls were said to have been made in the past five years with a record of but seven justifiable complaints.

Incoming calls are made up in duplicate on a 5-in. by 9-in. job ticket. The service man records all details of the equipment and of the repairs made upon this form, leav-

FLASH CALLING ALL CONTRACTORS

NOW, THE QUALITY LINE featured in NEW CATALOGUE

SEE OUR *NEW DEVELOPMENTS – NEW DESIGNS – NEW PRODUCTS – AND SEE THE*

opportunities this modern high quality line offers you. For the past five years our engineers have been constantly at work developing new products and designs to give you dependable products—designs that would create opportunities for you—NOW they are ready.

FA TRADE MARK

PRODUCTS

- Switches
- Service Equipment
- Enclosed Cutouts
- Panelboards and Cabinets
  - Lighting Branch
  - Feeder Distribution
  - Meter Control
- Switchboards
  - Light and Power
  - Stage Lighting Control
  - Mobile Lighting Control
- Junction & Pull Boxes and Telephone Boxes
- Floor Boxes
- Hanger Outlets
- Bus Duct and Wire Ways
- Heaters, Built-in and Portable

GET YOUR COPY!

A good business move on your part right now is to send for this new catalog. Let it help you make money.

Frank Adam
ELECTRIC COMPANY
ST. LOUIS

Frank Adam Electric Company, St. Louis, Mo.
Please send your new catalog.

Name .....

Company .....

Address .....

City ..... State .....

UMI

44 YEARS of FUSE MAKING

behind every

SHAWMUT SHUR-LAG RENEWABLE FUSE

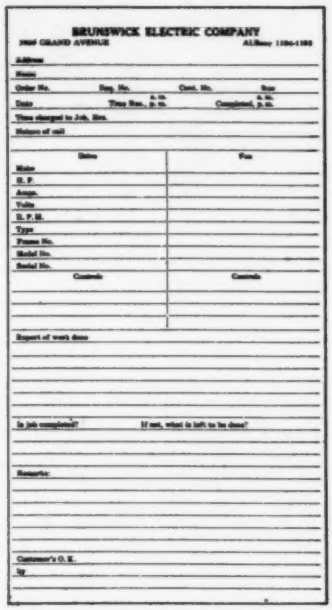
Since 1893, Chase-Shawmut has been specializing in the manufacture of fine fuses. Years of concentrated effort have resulted in the present SHUR-LAG line of quality renewable fuses. Construction is simple; yet 100% efficient, providing greater time lag under unusual overloads; prevents unnecessary blowing.

Write for the Shur-Lag folder, containing complete details, illustrations and prices.

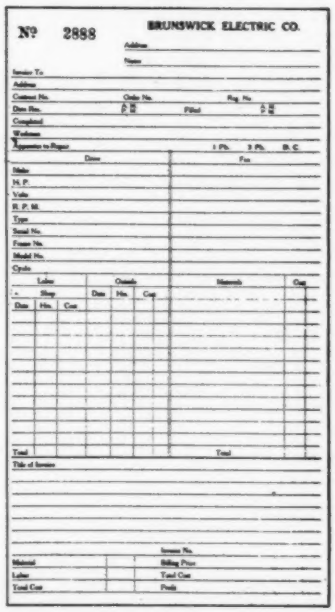
THE CHASE-SHAWMUT CO.
NEWBURYPORT, MASS.

FUSE SPECIALISTS SINCE 1893

ing the duplicate with the customer. The information is transferred from the completed job ticket to a permanent work order form when the ticket is returned to the office. The work order form is also 5 in. wide


BRUNSWICK ELECTRIC COMPANY

and 9 in. long. It is made of cardboard stock and has ruled spaces and columns for costing the labor and materials. After the work order has been costed, priced and invoiced, the job ticket is attached to it. Both forms are then filed away in numerical order. Future refer-


№ 2888 BRUNSWICK ELECTRIC CO.

ence to completed jobs is made first from the invoice records which carry the work order number thereon.

THE UNSEEN HAND

. . . that makes this type of installation

COMPLETELY AUTOMATIC

There is no better prospect for a Sangamo Time-Switch than the average store owner.

But . . . you must first explain to him how this unseen hand will turn his lights on when evening window shopping starts, and turn them off when prospects thin out.

The note to the left shows the willingness of Sangamo to help you sell him.

New

FREE ADVERTISING

A unique new folder will help you sell store owners. Ask your distributor for full particulars — it's free!

SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS

UMI

"Mr. Executive, I would be derelict in My Duty if I didn't point out the Money Saving Advantages of Turnlox."

TURNLOX

R.L.M. stands for certain high standards of illuminating efficiency which are certified by the Electrical Testing Laboratories of New York to be met by all products bearing this label.

The Economical Answer to the Problem of Maintaining R. L. M. Efficiency

To your customer, the maintenance of RIGHT LIGHT *efficiency* is just as important as his obtaining a RIGHT LIGHT *installation!* He must be shown WHY and HOW! And it is the duty of every member of the electrical industry to show him!

Not only must he be shown that blackened, inefficient lamps and dirty reflectors can waste from 20% to 80% of their rated R.L.M. efficiency but he should be shown HOW to avoid this loss at the lowest possible maintenance cost.

That is why TURNLOX, Benjamin's patented hood construction, is such an important feature to bring to the attention of every prospective buyer of industrial lighting equipment.

TURNLOX is the best answer to the maintenance problem. Its unique construction permits BOTH the reflector and lamp to be removed as one unit. Thus lamp inspection is simplified, frequent cleaning encouraged, cleaning costs reduced to a minimum. Safety, too, is promoted. The only time the cleaner need spend on the ladder is that required to replace the unit with a cleaned one. Thus the ladder hazard is reduced to a minimum.

If you do not have complete details on TURNLOX or complete data on all of the many Benjamin units which come equipped with this important feature, *Mail Coupon TODAY.*

TURNLOX FEATURES

3 POINT BAYONET COUPLING
- *Positive lock*
- *Immediate Connection*
- *No prongs or contacts to locate*
- *Automatic Polarization*

SELF CLEANING CONTACTS
- *Contacts are cleaned as the reflector is turned into hood.*

SPIRAL COMPRESSION SPRING
- *Insures positive electrical connection.*

EASY TO WIRE
- *Nothing in way or hard to reach.*
- *No screws to remove.*

BENJAMIN ELECTRIC MFG. CO., Dep't EC, Des Plaines, Ill.
SEND ME COMPLETE DETAILS ON TURNLOX

Firm Name_____
Name_____
Address_____
City_____ State_____

BENJAMIN
REFLECTORS

Maintenance . . . . .

Industrial and Commercial Wiring, Lighting and Power

ANNOUNCEMENT

• Improving industrial production, which in many instances is putting a strain on capacity, makes the maintenance of the electrical system and equipment more and more important. When deliveries are already delayed, every minute of production time has a definite earning value.

For that reason, ELECTRICAL CONTRACTING after many months of careful study presents this new department, *Maintenance,* to its readers as a timely service on the theory that good maintenance means not so much the repair of damaged equipment as it does the prevention of trouble. This section will deal with the latest practices in maintenance of wiring and electrical equipment.

For those engaged in industrial electrical work, ELECTRICAL CONTRACTING offers a well rounded service covering new and modernization wiring, power equipment application, National Electrical Code interpretations, service shop practice, and now *Maintenance.*

Pyranol power transformer, 900 KVA., 2,300 to 250 volts, 60 cycles, at Pittsfield Works of General Electric Company

Distribution Affects Plant Maintenance Costs

Those charged with the proper functioning of a plant's electrical equipment can prevent a lot of trouble by making sure that the power service installation and distribution system give the proper voltage at point of use, without fluctuations or interruptions.

At the left is shown a power transformer located in the center of a large factory area, with open-pipe railing sufficient for protection. Long runs of secondary electrical distribution are avoided, improving voltage regulation. This system also saves on first cost, because it has no expensive fire-proof vault.

Trouble-Shooting on Electric Motors

What's the Trouble?	*What to Look For*	*What to Do*
1. Motor Won't Start	No power	Close line switch Put in fuses Adjust, reset relays Adjust line switch, fuse, starter, and push-button contacts to close properly
	"Frozen" Bearings	Reline bearings
2. Motor Hums— *won't start*	One open phase	Adjust starter contacts to close Reset relay Put in new fuse Repair broken wire
3. Motor Starts Slowly	Overload on motor	When driven machine is new, check for hot bearings, locked gears, clogging, etc. Reduce starting load Use motor with greater horsepower capacity
	Low voltage	Increase feeder capacity Use motor designed for starting duty required by job
4. Motor Starts, Then Stops	Power failure	Renew fuses Adjust relays Adjust starter and push-button contacts Check to see whether larger motor should be installed
5. Motor Overheats	Overload	Use motor with greater horsepower capacity
	Poor ventilation	Blow out motor Remove restrictions around motor
	Rotor rubs stator	Replace worn bearing linings
	Operating single-phase	Renew fuses Adjust relays Adjust starter and push-button contacts
6. Motor Runs in Wrong Direction	Phases reversed	Reverse connections on motor lines Check if last connections were inadvertently reversed at switchboard, transformers or elsewhere

Pivoted Drive for Crowded Space

In order to shut down its boilers during the warm months, the Agar Food Products Company, Chicago, Ill., wanted to use auxiliary purchased electric power to run an ice machine which was direct-connected to a steam engine. But the installation had to be such as to permit use of the engine drive in winter.

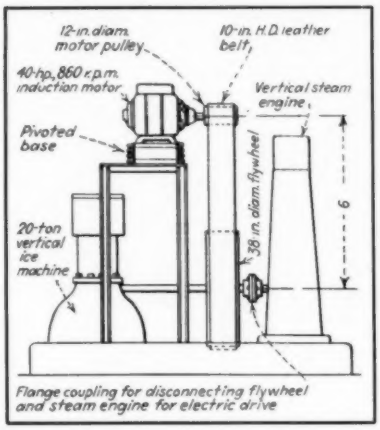

12-in. diam. motor pulley
10-in. H.D. leather belt
40-hp., 860 r.p.m. induction motor
Vertical steam engine
Pivoted base
38 in. diam. flywheel
6
20-ton vertical ice machine
Flange coupling for disconnecting flywheel and steam engine for electric drive

Fig. 1—Mounting the motor above the driven pulley, and maintaining proper belt tension by means of a springed pivoted base, permits this motor drive in super-crowded conditions

The trouble was that obstructions of crowded machinery on the floor and a maze of piping on the low

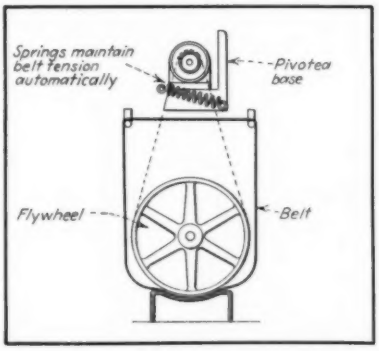


Fig. 2—Heavy line shows how belt is kept away from flywheel when ice machine is driven by engine; broken line shows belt in place for electric motor drive

ceiling made horizontal or diagonal belt driving impossible.

Use of a pivoted drive, permitting the motor to be mounted directly above the driven pulley, as shown in Fig. 1, solved the problem. Spring tension on the pivoted base provides automatic take-up. (Vertical belt drives without automatic take-up are wasteful and inefficient because any

little stretch in the belt immediately causes it to fall away from the lower pulley, with the result that the belt starts to slip, wasting power, losing driven speed, and burning the belt.)

Fig. 2 shows the method used to keep the belt away from the flywheel when the ice machine is driven by the steam engine. However, this may never occur, for an interesting side result of this installation was that a $4-a-day saving in operation is obtained in winter as well as in summer, because of the additional fuel consumption at the boilers when the steam drive is used.

How to Recondition Water-Soaked Electrical Equipment

1. Remove all dirt, grease, and oil; empty, clean, and wipe all bearings.

2. Small motors, transformers, and control coils should be dried in a repair-shop oven, temperature not to exceed 85 deg. C.

3. Large induction motors may be dried out in place by: (a) building inclosures and using external heat, not exceeding 85 deg. C. for Class A insulation; from resistance heaters or charcoal burners, and providing adequate ventilation; (b) using low-voltage current through the stator, with rotor stationary.

4. Synchronous motors may be dried out by: (a) rotating slowly by external power with low excitation on fields and with short-circuited armature; (b) same as 3-b, with field winding short-circuited.

5. Large shunt-wound d.c. motors may be dried out by: (a) same as 4-a with separate low-voltage excitation on field; (b) external low-voltage current on fields, at standstill.

6. Transformers may be dried out by: (a) draining oil and removing dirt; (b) same as 3-a; (c) same as 3-a with d.c. applied to high-voltage terminal only; (d) short circuiting low-tension winding, impressing enough a.c. voltage across high-tension winding to circulate enough current through coils to maintain a temperature not exceeding 80 deg. C.

7. Completion of drying period is determined by use of insulation resistance tests at regular intervals (completion indicated when curve approaches a constant value of resistance).

8. Give windings two or three coats of good, air-drying varnish.

9. Put oil through a filter or a centrifugal drier, and test.

Automatic Safety

Safety is properly the maintenance engineer's responsibility, and he should avail himself of every modern safety tool. Here's how Westinghouse "fenced in" some dangerous equipment in its East Pittsburgh laboratories. When an unwary worker crosses into the danger zone, he interrupts a light beam, and through phototubes and relays, shuts off the power.

Maintenance of INDUSTRIAL SIGNALING SYSTEMS

by Albert A. Schuhler

Signal Specialist

THE field of low-tension signaling equipment has increased to such an extent in recent years, that it becomes necessary to treat upon the subject of maintenance of such signaling systems which are considered in greatest use in industrial establishments.

Primarily, signaling equipment is installed in order to render service. This service results in greater convenience and efficiency to an organization or it may be designed to protect human life.

It is with these latter objects in mind, and the obvious necessity for keeping these systems in proper operating condition that the following outline of sources of trouble are given.

In order to properly maintain any signaling system, complete blueprints showing the wiring diagrams of all systems installed should be obtained from the manufacturers of the apparatus. These should be kept in the files of the department responsible for the repair and the maintenance of these systems, and should be referred to as the need arises.

Bell Systems

Ringing trouble general throughout system.

1—Check for weak battery, defective transformer, or "blown" fuses.

2—Examine pushbuttons or other circuit contacting units for defective contact between springs, and loose connections at terminals.

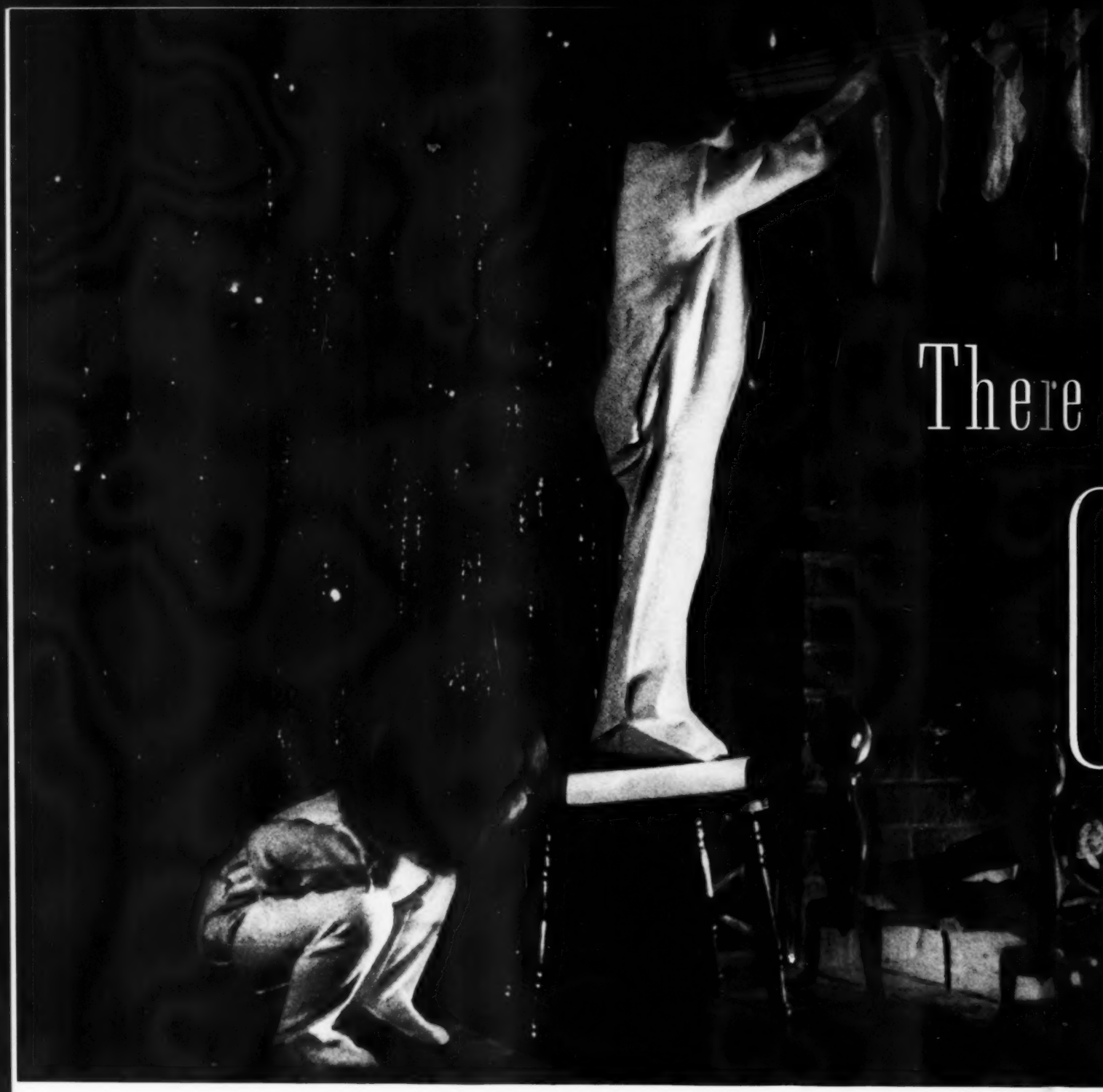
3—Test for open, short-circuited or grounded feeder and section wires.

4—Adjust bells.

Ringing trouble limited to part of system.

1—a—Examine bells for dirty or pitted contacts, caused by accumulation of dust, lint, oxidation or sparking due to excessive voltage.

b—Sticking armature resting against magnet cores caused by weak adjusting spring, or loss of



AGE cannot destroy, nor time erase the joys Christmas brings to the human heart. » » It is good to have confidence in our fellow men, and our confidence begets the confidence of others. » » The Safecote stamp is a mark of confidence . . . a confidence well deserved by the product. And so, at this Season, which is so symbolic of confidence, the manufacturers of Safecote wire wish you good health, prosperity, and confidence throughout the approaching year.

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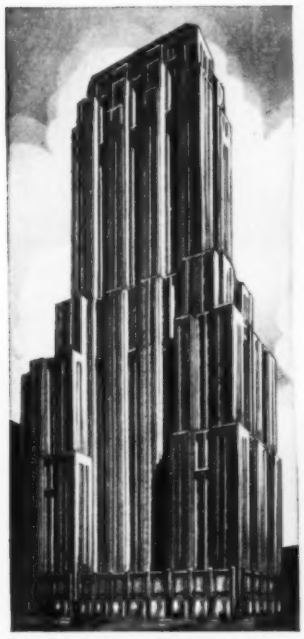
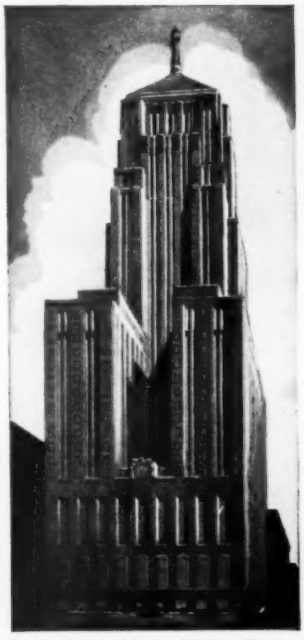


Palmolive Building, Chicago. Architects: Holabird & Root. General Contractors: Lundoff, Bicknell Co. Electrical Contractors: Hatfield Electric Co.



Chicago Board of Trade Building, Chicago. Architects: Holabird & Root. General Contractors: Hegeman-Harris Co. Electrical Contractors: Henry Newgard & Co.

William Taylor Hotel, San Francisco. Owners: Woods-Drury Co. Builders: Cahill Bros. Architect: Louis P. Hobart. Electrical Contractors: Latourette-Fical Co.

HAZARD FIREKROME SAFECOTE

is made with the long enduring Hazard insulation, covered with Safecote braid and has free stripping insulation; easy to handle; 6 identifying colors; does not become tacky or brittle; braid does not bunch up in conduits; lubricated for easy pulling. Hazard has been making insulated wire for 38 years, and has satisfactorily met every condition of service possible in that time.

HAZARD PERFORMITE SAFECOTE

combines the highest type of building wire insulation with Safecote braid covering. Performite gives super-performance in aging tests, and is tougher and stronger than any wire in common use. It is ideal for monumental buildings, public institutions and large residences. The Government uses this super-aging type of insulation for Federal buildings and other purposes.

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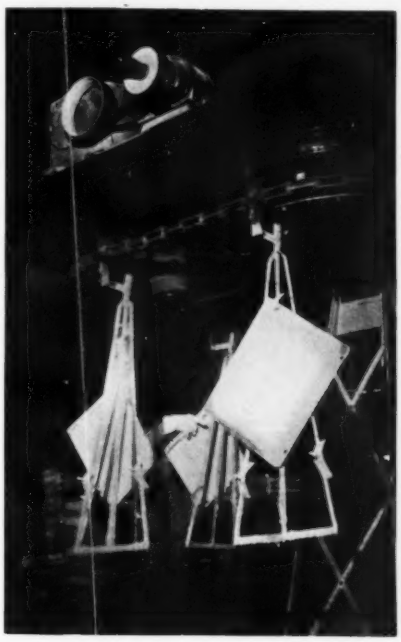
Problem: Slow Speeds, Variable Control



An application of variable control at slow speeds is illustrated at the right. Installation is at the plant of the American Stove Company, Cleveland, O.

After sheet steel parts which are to be covered with vitrified enamel are dipped in silicate of soda, they are hung on a trolley conveyor which carries them through a drying oven. Without being taken from the conveyor, they are sprayed with enamel, and then passed through a high-temperature enamelling oven.

The speed at which the parts are passed through the first oven is varied according to the size of the parts and the temperature of the oven. Because the rate of travel is slow, the speed of the motor is reduced by a gear reducer. Travel is further controlled by means of a variable-speed pulley on the drive shaft of the motor.

shading ring (piece of copper or brass) from end of electromagnet cores.

c—Defective adjustment between contact screw and contact spring.

d—Loose connections at terminals.

e—Open circuit in electromagnets.

2—Test for open, short-circuited or grounded wires leading to bells which do not ring.

More than required number of bells operate at same time.

1—Examine multiple pushbuttons, as contact springs which should be normally open circuit may be on closed circuit, due to sticking of push buttons, or contact springs may be broken.

2—Test for grounded, short-circuited or crossed section wires.

Audible Paging Systems

Ringing trouble general throughout system.

1—Check for weak battery, defective transformer, or "blown" fuses.

2—Examine transmitting station for defective contacting springs, selector mechanism and loose connections at terminals. If transmitter is of the motor-driven type, check motor. If transmitter is of the spring-driven type, check spring and winding mechanism.

3—Examine circuit relays for defective electromagnets, circuit contact springs and loose connections at terminals.

4—Examine connections at all bells or horns if connected in a series circuit. This applies to audible signals of the single-stroke or non-contact type.

5—Adjust bells in multiple circuits if of the contact type. If audible signals are of the single-stroke or non-contact type examine connections at terminals.

Ringing trouble limited to part of system.

1—a—Examine bells or horns if of the vibrating contact type same as described under bell systems. If the audible signals are of the single-stroke type and are connected in multiple, examine these units for sticking striking plungers caused by accumulation of dust, lint, or warping of insulating plunger tube.

b—Loose connections at terminals.

c—Open circuit in solenoid.

2—Test for open, short-circuited or grounded wires leading to bells which do not ring.

Fire Alarm Systems
(Closed Circuit Type)

Alarm and trouble bells do not operate.

1—Check for weak battery, or "blown" fuses supplying both operating and supervisory current.

2—Test for open or short-circuited feeder wires between service and control panel.

Alarm bells do not ring. Trouble bells ring.

1—Check for weak battery or "blown" fuses supplying operating current.

2—Test for open or short-circuited feeder wire on operating circuit.

3—Check time limit cut-out and if open, return to normal position. If time limit cut-out does not hold, station circuit is open or grounded.

4—Check milliameter. If reading is below the normal point recommended by the manufacturer, the bell circuit is open. If milliameter reads zero, station circuit is open.

5—Examine alarm bell circuit relay and station circuit relay for sound connections at contact springs and at terminals leading to coils of relays.

6—Test circuit wires leading to alarm bells and stations.

Alarm bells ring. Trouble bells do not ring.

1—Check for weak battery or "blown" fuses supplying supervisory current.

2—Test for open or short-circuited feeder wire on supervisory circuit.

3—Examine trouble bell relay contact springs for proper connection. Check for loose connections at terminals of this relay and trouble bells.

Instruments for Conductor Inspections

Efficient electrical maintenance of feeders and branch circuits is predicated upon periodic inspections with instruments because of changes in system and circuit load conditions and a gradual deterioration of conductor insulation. To carry on these inspections the following instruments will be found helpful:

Portable Ammeters. For d.c. feeders, a suitable size of shunt with a portable ammeter and leads. If all feeders are connected to one switchboard, and a switchboard ammeter is available for taking separate feeder readings, the portable ammeter is unnecessary.

Split Core Transformer-Ammeter. For a.c. feeders, a split-core current transformer with portable ammeter is useful for testing feeders and motor leads over the entire system. For rough checking, an instrument is available which combines a split-core transformer and ammeter mounted together in convenient form upon a tong-like assembly.

Portable Voltmeter. If desirable,

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a portable a.c., d.c. voltmeter can be obtained which will record a.c. and d.c. voltages. This meter can be purchased as a standard instrument with appropriate scales to suit the voltages in the plant.

Megohmmeters. Megohmmeters are available for the periodic measurement of insulation resistances in feeders and circuits. Such instruments are portable and are made in types to give accurate readings covering a wide range of insulation leakage or deterioration. The insulation of motor windings and other equipment such as transformers, relay or starter coils may also be tested at regular intervals to determine the presence of excessive moisture, oil and other foreign matter.

Isolated Varnish Storage

Insulating varnish is stored out of doors, piped into the dipping vat with air pressure and then drained back by gravity to its outside container, after motors are dipped in the service shop of the Georgia Electric and Construction Company, Columbus, Ga. About 40 to 45 lbs. air pressure forces the varnish to the vat through a 40-ft. run of 1¼-in. pipe from an 85-gal. storage tank located in the yard. The vat, which is a 60-gal. syrup cooking kettle mounted on a timber frame, has a

20-in. deep concave bottom with the 1¼-in. supply pipe connected at the low point.

Varnish is delivered to the vat by opening the 1¼-in. valve under the vat and opening a nearby valve in the ½-in. compressed air line that leads to the storage tank. When the desired varnish level has been obtained in the vat, the varnish supply air pressure valves are closed. A by-pass or relief hole in the closed air valve position allows the compressed air to escape from the varnish tank. Opening the varnish supply line valve beneath the vat after dipping is completed allows the left-over varnish to flow back into the storage tank. The varnish then remains sealed in from dust and air and, therefore, does not become scummed while awaiting the next dipping job.

When the Lights Flicker

Where light is flickering or poor, the fault may be inadequate wiring. A check should be made of the watts of lighting connected per circuit, and the floor area per circuit, and comparison made with recognized standards.

Minimum specifications for adequate wiring call for initial wattage per circuit of 1,000, and a floor area of 400 sq.ft. per circuit. Any new work or renovating should conform to the specifications. Certain exceptions for industrial plants are:

Storage of bulk materials, etc., 12,000 sq.ft. per circuit.

Rough work, thoroughfares, materials handling, etc., 600 sq.ft. per circuit.

Removing Stator Cell Insulation

After removing the windings from closed-slot a.c. stators, the cell insulation usually sticks within the slots because of thorough impregnation at

the time previous coils were installed. This insulation responds quickly when subjected to a torch flame. The flame is applied over an area of six to ten slots after which the cells will readily yield their laminated sheets of insulation when a hacksaw blade is shoved lengthwise through the slot. Action photo from A. C. Motor Service Company, Jersey City, N. J.

Questions and Answers

Hot Armature Bearings

Out of about 700 135-hp., 600-volt street railway armatures there are two that give us much trouble because of badly worn or hot armature bearings. These two armatures are never replaced in the same motor shells, and we have inserted new shafts, put in new coils, balanced them, and so on. These defects have continued over a period of seven years. What is causing the trouble, and how can we cure it?

With old armatures that have been in heavy duty and been repeatedly overheated, there is a tendency for the laminations to weld or stick together in places. Such a core will generate more heat than normal, owing to the heavy eddy currents. A large portion of this heat is transmitted to the shaft and bearings.

The remedy in such cases is to dismantle the armature core and dip each lamination in a thin japan or varnish, and then bake or allow to dry. Care should be taken to reassemble the laminations in the order in which they were taken off.

D.C. Field Pole Rewind

When rewinding d. c. field poles, should poles of opposite polarity be obtained by reversing the leads when connecting up the winding, or by reversing the direction of the winding on the poles?

Wind all coils for a d. c. field pole job identically. When winding, sleeve each beginning lead with white sleeving and each finish lead with black sleeving. If this is done, when the coils are ready to be connected the winder will not have to trace out the direction of the winding.

Removing Motor Fans

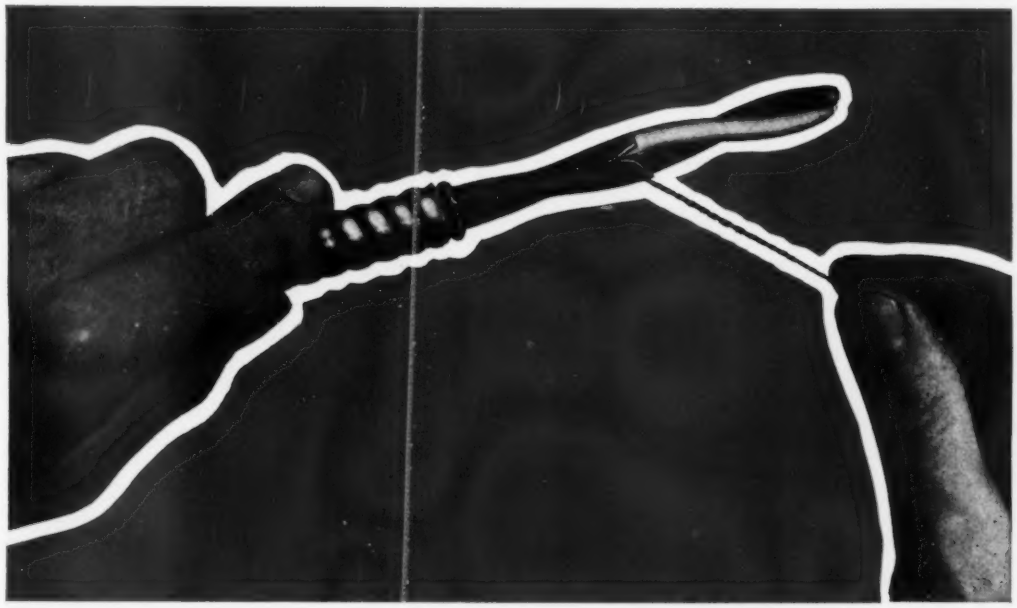
What is the most practical method of removing the small stamped or cast ventilating fans from the end of an armature?

Most fan assemblies are shrink-fitted on the shaft; others are a driving fit with a tapered pin driven through the fan hub and shaft. Some motors have fans that are driven on to a knurled section of the shaft.

To remove the fan, first drive out the tapered pin, if one is used. Then place two substantial strips of metal under the hub of the fan and support their ends so that a few smart blows with a rawhide mallet on the end of the shaft will drive it through the fan. If the fan cannot be moved in this way, direct the flame of a blowtorch against the hub to expand it slightly.

A QUICK TUG . . .

and the paper is Off



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SAFE *and* CONVENIENT

SAFE because of the high quality of the HAZACODE rubber insulated conductors; the moisture resisting, flame-retarding finish of the braids; and the moisture and flame-proof wrapping enclosing the conductors.

CONVENIENT because the quick strip feature saves time for the wireman. One tug and the paper is off! And the rubber insulation strips easily, leaving the conductor clean and bright.

Your request will bring samples and literature.

The bushing has the distinctive projection which holds it firmly in place and prevents the cut edge of the steel from injuring the insulated conductors.

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Why not
"No work today...the feeder blew"
Modernize those obsolete, deficient electric circuits now! One breakdown may cost thousands in interrupted production. Let us send you a free check chart with which to make a Wiring Survey of your plant
Too many manufacturers, speed-ups in production are proving dangerous. Underrated or antiquated cables can't stand the strain. A typical example: a main feeder blew, crippling production in one department. Other departments dependent upon the first one were forced to stop. Result: practically a complete shut-down for twenty-four hours! All because management had failed to modernize wiring!
9 out of 10 factories have deficient wiring—Estimates show that 9 out of 10 plants today are handicapped by antiquated electric circuits. Even when actual breakdowns do not occur, money is being lost in other ways. Power wasted through heat losses is one. Excessive maintenance and repair costs is another. Slowing down of machines due to voltage drops is a third.
Often the losses are 'invisible'. They are not billed to the treasurer, yet he pays for them just the same. In every case, the proverbial "stitch in time" would remedy matters.
Check up your factory's electric circuits—Are you getting full use of the power you buy? It will cost you nothing to find out. This Survey is yours for the asking. It will show you how to check your factory's circuits.
Get our Wiring Survey
Write for it—then put the problem up to your electrical engineer, your industrial consultant, or electrical contractor. If you have a specific problem in mind, consult our engineering department. We will cooperate without obligation.
"In justice to labor... in fairness to capital... modernize the electric wiring in your plant."
SEND FOR YOUR COPY
Modernized wiring aids plant operation in these 6 ways
1 Prevents breakdowns that retard production and cause labor to lose wages.
2 Prevents light losses and slowing down of machines due to voltage drop.
3 Prevents dissipation of power in form of heat.
4 Lowers maintenance and repair costs.
5 Permits shifting of equipment or installation of new machinery with minimum delay.
6 Protects safety of workers and lowers insurance rates.
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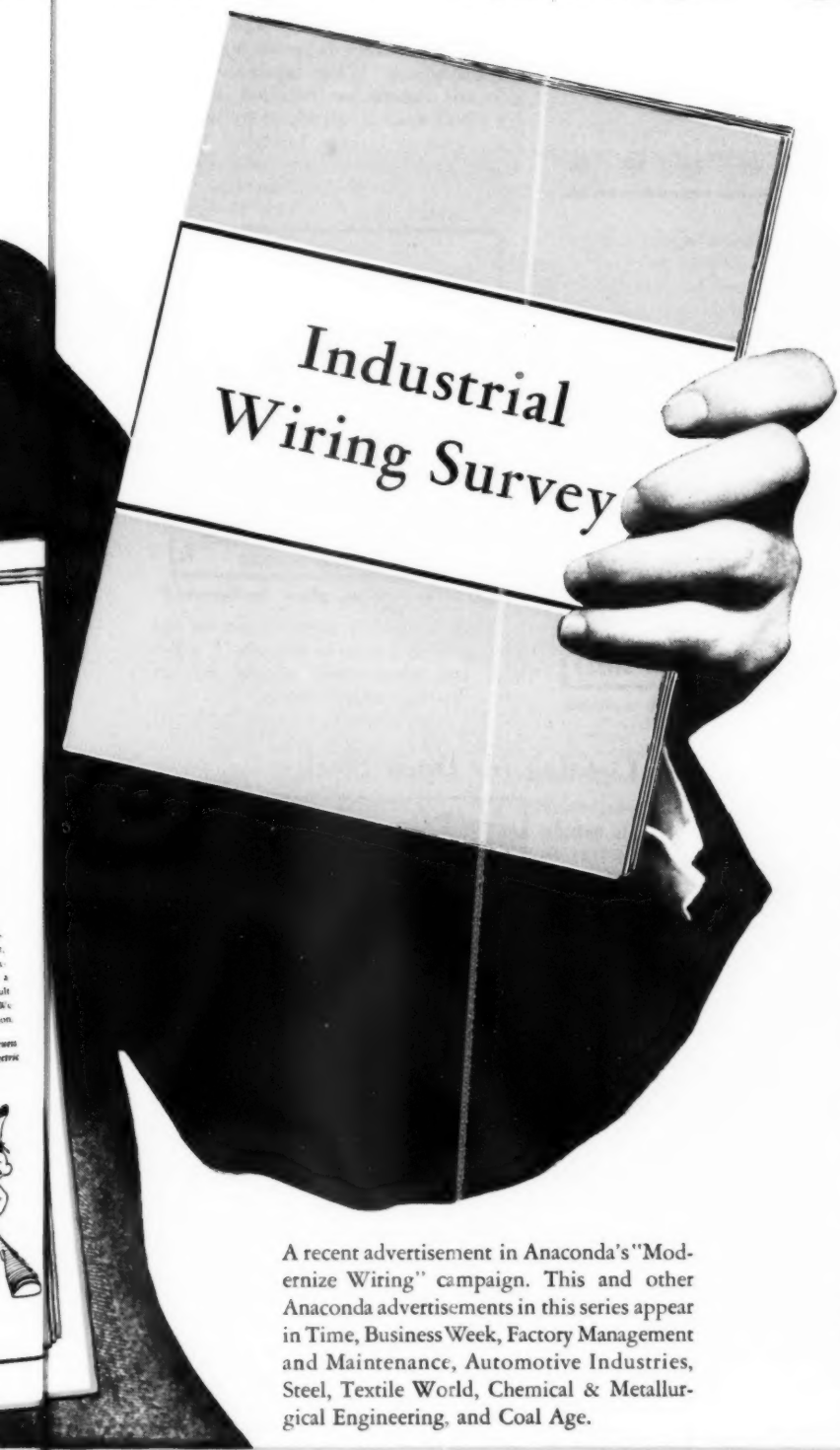

A recent advertisement in Anaconda's "Modernize Wiring" campaign. This and other Anaconda advertisements in this series appear in Time, Business Week, Factory Management and Maintenance, Automotive Industries, Steel, Textile World, Chemical & Metallurgical Engineering, and Coal Age.

It will enable you to cash in on our "Modernize Wiring" campaign by giving you a definite "check-up" plan to offer the industrial plant manager

Those familiar with successful industrial wiring promotion say that the best way to obtain modernization jobs is by making a systematic check-up of a prospect's wiring system.

The Wiring Survey just prepared is designed for exactly this purpose. The check chart is helpful in studying circuits and presenting conclusions to plant managers. It is for you to use when soliciting industrial wiring business.

Send for your copy and familiarize yourself with the Anaconda program. The "Modernize Wiring" campaign is sound economics. It shows the plant owner how to save money. It promotes the efficient use of electricity. This should lead to the purchase of more power and more electrical equipment.

You are of course eager to develop all the wiring business you can. This Wiring Survey gives you the "door opener" you have been wanting. Your copy is free. Write for it now. The coupon is for your convenience.

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ANACONDA WIRE & CABLE CO.
25 Broadway, New York City

We should like a copy of your "Wiring Survey" together with other information about your "Modernize Wiring" program.

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*Street*_____

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Company

• *Sales Offices in Principal Cities*

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Lighting Data

Display Lighting Suggestions

Either built-in or built-on shelving of the kind shown in Fig. 1 provides a good location for display purposes. The sketch, Fig. 2, shows how an opal glass box, around which the shelves are set, may be

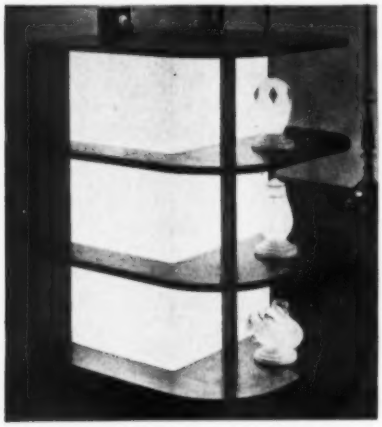

Fig. 1. Lighted built-in shelving

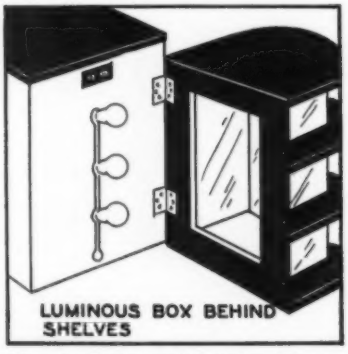

Fig. 2. Details of lighting Fig. 1

lighted with colored lamps to produce an attractive, luminous, pastel color background for the articles on display.

Fig. 3 shows how lighting can be applied effectively to shelves surrounding a column. Lumiline lamps under the front edge are concealed by a narrow shield which appears to be a part of the shelf. The under side of the shelf should be painted white to reflect the light to the articles below.

Bottled goods or glassware can be attractively displayed against a luminous glass background as shown in Fig. 4. The space behind the opal glass panel should be painted white.

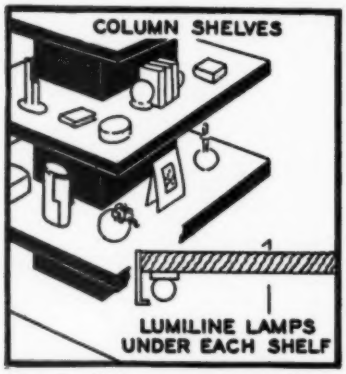

Fig. 3. Shelves around a column

Place the lamps as far back from the glass as possible and space them no farther apart than one and a half times the distance between lamp center and glass. When luminous backgrounds cannot be installed, a similar effect may be obtained by mounting white or colored Lumiline lamps along the back of the shelves behind the translucent merchandise. Where shelves are above eye level,

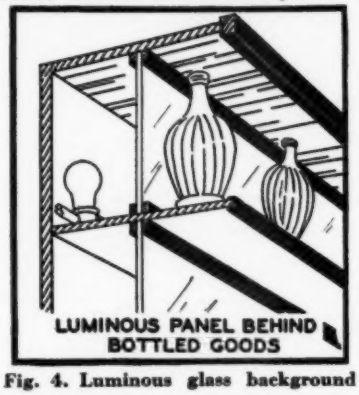

Fig. 4. Luminous glass background

the lamps should be mounted on the background close to the shelf. Below eye level, they should be set close to the shelf above.

Trough Lighting for Open Stock

The entire face of an open stock shelving, as shown in Fig. 1, can be bathed in light by placing lamps in concentrating trough reflectors across the top. The trough should be mounted 8 to 12 in. out from the case. A parabolic metal trough, with a 60-watt white Lumiline lamp, as shown in Fig. 2, makes a neat unit for this purpose. Larger troughs,

Fig. 2. Parabolic trough with Lumiline lamps

Fig. 3. Glass sign troughs

Fig. 1. Concentrating trough

KNOW THE MEANING OF THE RLM LABEL

On Industrial Lighting Reflectors

To your customers, the RLM label means better light, more light, lower operating and maintenance costs. Show them *why,* by pointing out the three-fold advantage of reflectors bearing this label . . . . you will guarantee yourself the extra profits to be made by selling the best in lighting.

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RLM Standards Institute, is a non-profit organization, dedicated to the establishment and maintenance of quality standards in industrial lighting equipment.

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1 MORE LIGHT AT NO EXTRA COST

Efficiency specifications for RLM reflectors are from 10-12% higher than average reflector efficiency. Yet RLM reflectors cost so little more that the higher light output month after month and year after year saves . . . many times over . . . the slight additional first cost.

2 PORCELAIN ENAMEL REFLECTING SURFACE

RLM standard specifications insist on the highest grade of porcelain enameled steel, for economy and efficiency. Durable . . . impervious to any atmospheric condition . . . unbreakable . . . this material lowers maintenance costs. Its perfect reflector surface insures unsurpassed all-round light efficiency.

3 WARRANTY OF UNIFORM QUALITY

Reflectors bearing the RLM Label have passed the periodical inspections made by the well known, independent organization, the Electrical Testing Laboratories. This label certifies that the reflectors conform, in every detail, to the RLM standards established by the RLM Standards Institute.

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● Such a conversation is not uncommon today. "Tailor-made" glassware takes on a new importance as architects and fixture manufacturers demand designs harmonizing with the general scheme of a building or the modern small home. The solution can come from one source only—the designing engineer who specializes in illuminating glassware. His is the task of creating units which meet not only the exacting specifications of design but must also deliver the maximum in lighting efficiency.

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Quality
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CONSOLIDATED
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such as shown in Fig. 1, may also incorporate a glass sign, Fig. 3, on which lettering may be easily changed as desired. In this type of equipment, 40 or 60-watt lamps are generally used on 10 to 12-in. centers. The goods displayed should be placed well forward on the shelves to avoid shadowing from the shelf above.

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15 - Foot - Candle Decorative Lighting

Unusual decorative lighting effects designed, however, fundamentally to be utilitarian in purpose give the new Chrysler show room in New York a floor level illumination value

Photo by F. S. Lincoln

of 15 foot-candles. The cars are displayed on a revolving floor above which are two circular and concentric flush lighting troughs corresponding with the inner and outer edges of the turntable. These project on the cars a concentrated beam of light through glass filters.

The entrances as well as the alcoves and door areas are all illuminated by these flush ceiling fixtures equipped with reflectors and glass filters. The color of the light may be varied by changing the filters.

The lighting of the first floor consists of one-color illumination that is complementary to colors in the car display. The controls, located in a special electric closet near the entrance, are so arranged that one-half or full intensity of illumination can be attained.

The area north of the turntable is illuminated by a decorative lighting fixture surrounded by four columns. On the escalators, special lighting extends the full length of the hand rails and projects downward onto the steppings. Duplex receptacles are situated around the perimeter of the room and on the various columns to provide for spotlights and special lighting effects.

Layout for Larger Lamps

When you can't be certain as to the lamp wattages, play safe on the higher size, is the recommendation of W. H. Jenks, Richmond, Va. If a 750-watt layout can later be reduced to 500's, there's no complaint, but just try and go up in wattage after your initial sale is found to be lacking. It just doesn't work, says Mr. Jenks, who has been a keen advocate of good lighting for his 40 years in business.

Lighting Conditions in Cleaning and Pressing Industry

Data obtained from ten Chicago plants and presented by M. W. Ross, Commonwealth Edison Company, before the thirtieth annual convention of the Illumination Engineering Society.

Operation	Foot-candles			Type of Lighting and Equipment
	Minimum	Average	Maximum	
Receiving	1	4	7	General lighting.
Checking and Sorting	3	8	50	Low hanging drop cords with RLM and tin-cone reflectors, some bare lamps
Dry Cleaning	3	5	8	Vapor proof equipment without reflectors. General lighting
Steaming	2	4	6	General lighting
Examining and Spotting	8	30	40	Work is done under 100 to 200 foot-candles of daylight whenever possible
Laundry or Wet Cleaning	3	5	8	General lighting. Distribution very poor
Repair and Alteration	5	13	60	Many bare lamps. Balance in shades suspended below eye level
Machine Finishing	6	11	20	General lighting with some bare lamps
Hand Finishing	2	12	60	Majority use a local light on drop cord
Final Inspection	15	20	40	Work is done under 100 to 200 foot-candles of daylight whenever possible
Shipping	5	8	50	Combination local and general lighting

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CRESCENT WIRE

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The battery of more than one thousand braiding machines, shown in the above picture, is used to apply cotton, silk and rayon braids in the manufacture of CRESCENT insulated wires and cables. This is only one of the many operations that go on in this extensive plant, where a complete line assures you of one reliable source of supply.

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Code Chats . . . . .

Questions and answers relating to the interpretation of the National Electrical Code . . .

Conducted by F. N. M. Squires

Chief Inspector New York Board of Fire Underwriters

Leaded Armored Cable for Underground Work

I am planning on a residence underground installation of 3-conductor No. 8 lead covered armored cable from pole to garage meter and to a meter service switch that will be fused at 35 amp. The same service conductor will be extended to a branch circuit cabinet in the house. These cables will be buried at least 3 ft. Is this permissible?

Lead covered armored cable, type ACL, may be used for underground runs. This, however, is not very strongly recommended and probably an underground service entrance cable (type USE) would have a longer life and, therefore, be more satisfactory. It could, however, be used both for the service run and for the feed from the garage to the house.

From the letter, it is assumed that the line to the garage is connected to the house side of the service fuse and, therefore, as the service fuses are the only ones protecting the feed to the house, which is No. 8, as well as the short feed from the service switch to the garage panel, the service fuses must not be larger than 35 amp.

Use of Weatherproof Wire

In Section 607 are given the specifications for the installation of weatherproof wire. Where may this wire be used? Can it be used in conduit?

Weatherproof wire, type WP, is not approved for use in conduit. While the specifications for this type of wire are in Article 6, Section 607, the installation rules are found throughout Article 5. A careful check on the various rules of Article 5 discloses that weatherproof wire is permitted for one type of wiring method and under one condition only. This is found in rule 501-d and refers only to open conductors (open wiring or cleat work) and where subject to corrosive vapors. Even here its use is not mandatory, but is optional with rubber covered wire or with varnished cambric wire.

A Problem for Discussion

A fire occurred recently in a run of armored cable connecting a three-way switch in the garage circuit of a home which the writer wired two years ago. The run of cable and a wooden beam were burned badly. There was a spiral burn through the metal armor of the 3-wire cable for a distance of about 3 ft. The circuit was protected by a 15-amp. fuse and the system was bonded and grounded to an artesian well pipe. There are two lighting circuits, a range and a water heater in this home operated through a 60-amp. 3-wire service. Will some of your readers explain why this fuse did not blow?

After replacing the burned cable with new, I short circuited the hot wire and had great difficulty in finally blowing the fuse. I burned the ends off of two screw drivers in doing so. I tested for a ground between the hot wire and the sheath and got a satisfactory result.

The editor of this column has written to the above correspondent for additional information before expressing an opinion as to the cause of the disturbance. Discussion relative to the probable cause is earnestly solicited from any who may have had similar cases or who may believe that they know the answer to the problem.

ENCOURAGES NEAT WORKMANSHIP: While code compliance is generally considered the limit of an inspector's jurisdiction over electrical workmanship, J. W. Dunning, electrical inspector of Columbia, S. C., strives for better looking roughed-in jobs. Work that is roughed-in neatly, particularly in residences, makes a better impression on all concerned, says Mr. Dunning, and builds a higher regard for the electrical work as an important part of safe construction practice. The electrical department's design for identifying its cars is pointed out by Mr. Dunning as speeding up inspections in occupied homes. The lettering is readable from across the street, therefore, no time is lost in making one's mission known in a strange neighborhood.

Fuse Reducers

Is it permissible to use a fuse of a smaller classification than the cutout base with which it is employed? That is to use a 35-amp. fuse in a 61-100-amp. base?

Yes, if an approved fuse reducer is used, this is permissible. The Underwriters' Laboratories list fuse reducers of two manufactures which are made for this purpose.

Rule 801-d prohibits the use of a cutout base of one class with a fuse of a higher amperage or voltage class, but states this very carefully so that it does not prohibit the reverse order of using a smaller fuse with a base of a higher amperage class.

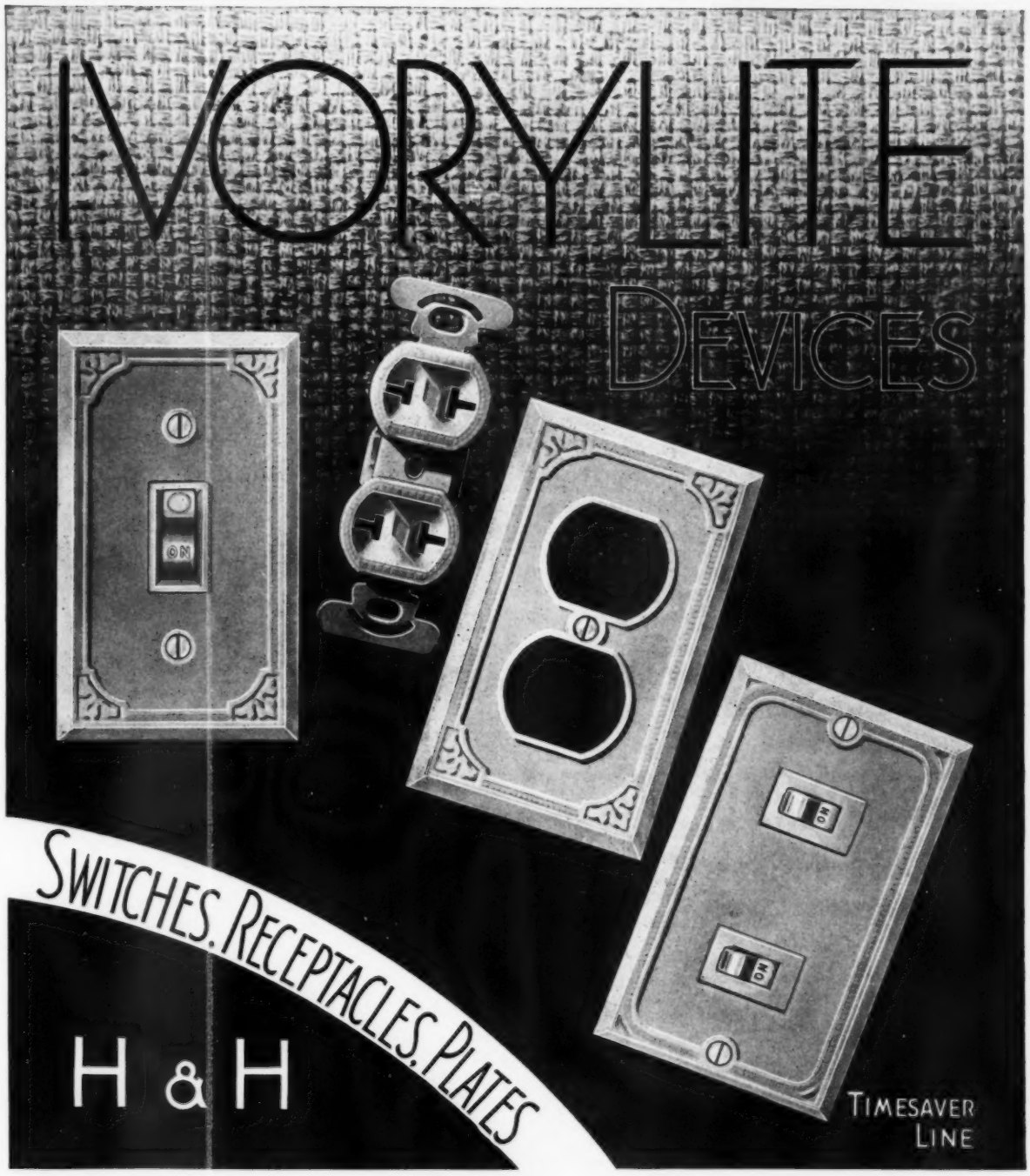
One thing must not be attempted, however, and that is to use a fuse of a lower voltage class than the fuse base. That is, we must not use a 250-volt fuse in a 600-volt cutout base. While the present Code does not so state it at present, the next edition of the Code will make this clear.

New or Old Type Ground Clamp

A new service was installed to replace one that had become too small. The old main switch was adapted and re-used, and the old ground wire was re-connected to the new service. Is the inspector justified in filing a violation "Ground clamp not of approved type?"

The advent of a new rule does not make that rule retroactive to require that all old installations be made to comply with the new requirement. If, however, changes or repairs are made to old equipment, then there is often a question.

In the case mentioned above, the inspector should not ask for a change in the style of ground clamp providing the old type of ground clamp is still tightly gripping the water pipe and is not corroded but is in good order, and further provided



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that the grounding conductor is of proper size and properly installed.

Of course, if a new grounding conductor had to be installed to meet a change of condition, then the new style of rigid base ground clamp should be used. If the old strap type of clamps is at all loose on the water pipe and in need of tightening, then the rigid type base one should be used, as this loosening is just the reason for the change in the rule.

A Possible Circuit Layout

There is a two-wire No. 6 service feeding 60-amp. service equipment. After the meter is a 50-amp. main line fuse. Two No. 6 wires are then run to a range outlet in the kitchen. Can a pair of No. 14 wires be tapped to the No. 6 wires at the kitchen base board in the range receptacle box, and run up the wall for about 6 ft. to supply a panelette from which is run two circuits for lights?

Such an arrangement is permissible if certain modifications are made and certain precautions taken.

The No. 6 range circuit wire is to be protected with fuses not larger than 50-amp. Then the smaller wires tapped off of the No. 6 must be protected against mechanical injury and should be at least No. 12, unless a fuse is provided at the point of tap off. Then the No. 12 wire tap at the panelette should be terminated in a single fuse of not over 20 amp. After passing through the single 20-amp. fuse, the circuit may feed the two branch fuses. With a three-wire No. 6 installation, the problem would be a little simpler as the No. 2 tap could then be three-wire and the single fuse at the terminal could be of 15 amp., which would then protect both the tap and the branch circuit.

There is, of course, a technical point in this problem and that is, the connection of the tap off, which comes under the category of a feeder, to a range branch circuit. It has not been generally considered "according to Hoyle", to use conductors both as feeders and as circuit wires and there are many inspection bureaus which would object to such usage. Their objections would be overcome by the provision of range fuses at the range receptacle.

Let us assume that there is a load of 10 amp. on the lighting circuit. We then have with a 50-amp. main fuse but 40 amp. capacity left for the range before the fuse will operate, which of course, gives us better protection than if we had to use the whole of the 50 amp. before the fuse would operate.

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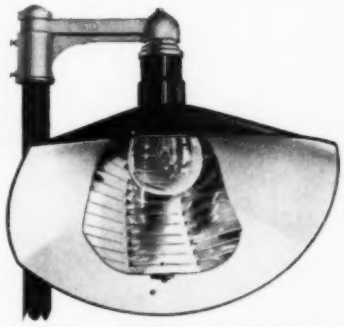

This new series of larger Quad Floodlights was designed for 750, 1000, and 1500 watt lamps only. The reflector is 19½" x 26½". Light distribution and mechanical features are practically the same as the well known standard line of Quad Floodlights, the outstanding difference is that the reflectors are greatly increased in size and have a wider light cut off angle in horizontal plane.

The "six-ninety series is another Quad achievement in good lighting and it also places in your hands a bigger and better sales opportunity. You can go after more lighting jobs with the assurance that Quad will work with you, that your customers will be satisfied, and that you are building up a good, sound source of income through repeat sales with a profit on every sale. Let us send you complete details on our units.

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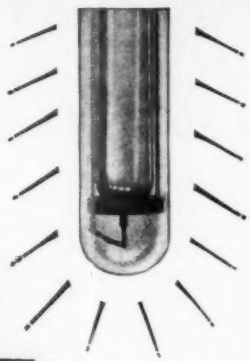

The new mercury lamps give more light per unit of current — reduce electric bills—Jefferson Transformers insure maximum economy.

Wall Mounted Type in neat metal case for mounting on wall or post. Bottom is open for ready access to wiring compartment. Snap-on connections make it easy to match primary supply line voltage.

(Wall-mounted and fixture types are equipped with primary tap changing device and large primary and secondary wiring compartments.)

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Industrial plants, steel mills, railroads, service stations, large stores—all industry—are finding the new high efficiency of mercury lamps an immediate means of improving illumination and cutting electric bills in half.

Jefferson Transformers for use with these lamps insure the expected full rated capacity and satisfactory performance. They keep the current demand low during the starting period and on continuous operation show low temperature rise. A special core has been designed, made up of very thin laminations of high silicon steel, annealed after punching to prevent ageing, and to insure cool operation.

Easy, "Screw-Driver" Installation

The terminal connections are easily made with a screw-driver, —no pigtails to solder.—And the wiring compartment covers have permanently attached screws to save time and loss.—Width and depth are smaller to improve the appearance.

Jefferson's long specialized experience in the development of transformers for mercury and Neon luminous tubes, sun lamps, street lights and the like, makes possible the high quality special types of transformers and reactors required for these mercury lamps.

Available for use with both 250-watt and 400-watt lamps.

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Business Leaders—Executives, Engineers, and Production Managers—Are Releasing Billions for Industrial Expansion

McGraw-Hill Editors See Uprise in the Heavy Industries

TOP EXECUTIVES OF AMERICAN BUSINESS ARE LOOSENING THE PURSE STRINGS

GLENN GRISWOLD
Editor
Business Week

Business is confidently basing its plans for the next year on the premise that the general trend will be definitely upward. Evidently nothing short of a world catastrophe can stifle the forces that are pressing inexorably toward a greater volume and velocity of business.

Every business index tends to confirm this conclusion. And it is to be remembered that the business expansion we have experienced in the last two years has in most cases amounted only to the almost irreducible minimum necessary to meet the urgent demand of consumptive wants. We have only begun to fill the accumulated wants of one of the longest and worst periods of depression in our history. ***Unprecedented high records will be set next year in the sale of consumer and industrial goods.*** The BUSINESS WEEK Index of Business Activity confirms the opinion that there is sufficient room for this anticipated expansion. While all business indices reveal the upward trend, it is significant to observe that BUSINESS WEEK's index stands at but 77% of normal and probably will average about 75% for the year 1936.

Any appraisal of the outlook for business must take into consideration the existence of the American urge to launch new enterprises. There has been insufficient stimulus to this impulse and practically nothing thus far has been contributed by these new developments towards industrial recovery. A tremendous unfilled market anxiously awaits their growth.

Business men have yearned for a new industry which would perform the recovery miracle accomplished by the automobile and the radio. Two such industries are actively functioning today and will be responsible for a staggering total of new business next year. One such able contributor is air conditioning which holds forth untold possibilities. Another, perhaps of greater potentiality, is the building and construction fields which have increased substantially yet have not approached the levels of 1928 and 1929. In these fields, air conditioning, noise and dirt elimination and electrification promise to make the homes of America obsolete to a degree we have not known since the turn of the century when central heating, modern plumbing and electric lighting accomplished a similar revolution. The same forces are rapidly adding a great burden of obsolescence to office buildings and factories.

Whatever concern one may have for the long time economy of this country if present tendencies are continued, the prospect for the immediate future gives promise of greater activity increased sales, business expansion and growing profits.

Construction of new industrial plants is running 50 per cent over 1935.

PLANT EXPANSION AS WELL AS MODERNIZED MACHINERY AGAIN IN DEMAND

L. C. MORROW
Editor
Factory Management and Maintenance

Manufacturers of durable as well as consumer goods find their sales curves rising along with the curve of general business. Higher sales call for higher production which in turn calls for plant improvement, additions, and new capacity. Management has recovered from any fears it may have had that technological development and modern machinery spells unemployment, and is going ahead with confidence in its search for more efficient equipment.

That modernization and expansion are already proceeding at a gratifying pace is indicated by a partial list of proposed industrial expenditures announced publicly since July. Of the 58 manufacturing corporations and utilities included in the list, no one announced expenditures of less than half a million. Most of the programs provide for more; for example $29,000,000 by U. S. Steel, $25,000,000 by Fisher Body, $14,500,000 by Buick, $13,000,000 by Standard Oil of N. J., $7,500,000 by Industrial Rayon, $5,000,000 by Chrysler. *A very large number of smaller organizations are planning substantial expenditures corresponding to their size.*

These expenditures are for improvements, additions, and new capacity. Part of the money will go for new buildings, *but much of it for new equipment.*

In its recent statistical issue *Factory* pointed out that over the past six years America failed to build $29 Billion worth of houses and other buildings for which a real need exists. This shortage means a potential $18,000,000,000 market for the products of the manufacturing industries. Other potential markets pointed out were for electrical appliances $16,000,000,000 — farm electrification $5,000,000,000 — central station expansion, $3,000,000,000 — machine tools $1,000,000,000 — industrial power plants $4,000,000,000 — air-conditioning equipment $1,000,000,000.

All these markets are in sight. How soon they are to become realities will depend upon the aggressiveness with which business develops them. Sales-minded organizations are planning their sales and advertising for major gains in 1937.

MODERN POWER PLANT EQUIPMENT OFFERS HUGE SAVINGS TO INDUSTRY

P. W. SWAIN
Editor
Power

Picture a field that is not itself an industry, but embraces all industries — a field responsive to every forward step in living standards, working conditions and production efficiency, a field that spends two billion dollars yearly for its raw materials — in short, *power*. This field is the total of the power-service generating equipment in America's stationary plants: central stations, (steam, hydro, and diesel) power plants in industry, large buildings and institutions.

For steam coal alone, this power field spends a billion dollars yearly. Plants outside of central stations spend another half billion for purchased electricity, in addition to the very large amounts they generate locally. Add labor, repairs and supplies, and you have a yearly total operating expenditure of at least two billion dollars for America's power services.

Of this huge sum, approximately one billion dollars, 50%, is preventable waste, in the opinion of engineers best qualified to know. This means waste in production and consumption that could be eliminated by methods and equipment already in common use by the more progressive establishments.

More than half of all the industrial and institutional power-service equipment is over twenty years old, and most of this old equipment is obsolete. Boilers operate at 50 or 60 per cent efficiency when 80 per cent is easily obtainable. Often new high-pressure boilers would give far greater gains, on top of the increased efficiency, through increased production of by-product electricity.

Building and factory heating and process systems are wide open markets for meters and controls that will eliminate the appalling wastes in application. Thousands of pumps are so wasteful and obsolete that new modern replacement units would save their cost in less than a year.

Undoubtedly the primary key to the industrial power market is the elimination of this waste by modernization. Through constant publicity industrial executives are becoming generally aware of these losses. Improving general business is bringing action, proved by rapidly mounting orders for power equipment.

LET business paper advertising be your mass production sales tool. It goes directly to those key men who control or participate in the spending of 30 billion dollars a year for business and industrial equipment and supplies. Business paper advertising talks their language. It offers them savings and betterments in their business. It cuts the cost of selling because it educates buyers on the merits and reputation of your product before your salesman calls.

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ELECTRICAL CONTRACTING

S. B. WILLIAMS, Editor

The Cost of Incorporation

A GLANCE through a list of contractors shows a great many small and medium size businesses to be incorporated. Perhaps this is a good time to look into the value of incorporation in view of the taxes that businesses so set up must pay.

Undoubtedly the element of personal liability has caused many contractors to incorporate, but for many contracting businesses that protection can now be very expensive. It would do no harm for such businesses to seek legal advice on the advantages and disadvantages of remaining incorporated.

Industry Committees

ONE of the plans of the Joint Industry Committee for Business Development is the formation of similar local joint committees and a number have already been appointed. Much good can come from these committees provided they are set up on the right basis and the work is of a constructive nature.

Unfortunately, the emphasis so far has been rather strong on the elimination of trade abuses and the adjustment of internal industry differences. The improvement of trade relations has an important place in industry cooperation, and without good relations such cooperation cannot make much, if any, progress.

Nevertheless if this local cooperative movement is to take up much time in hearing complaints, adjusting differences and generally acting as a board of arbitration, it isn't going to be long before it breaks up.

The one thing that can make for success in this cooperative movement is market development. When the local industry learns how to work together for more business, many of the petty complaints of one group against another will be found to have disappeared. Any major complaints will be adjusted quickly and satisfactorily because by that time the cooperative value of the several groups will have become an asset, the value of which must be preserved.

This program should not be set up in any city until the contractors, dealers, wholesalers and utilities have agreed upon a marketing program and the several groups have accepted their responsibility in the promotion of that program. If such a program is not the first and most important consideration, the local committee may easily become a complaint adjuster and that would be fatal.

Adequacy at Work

WHEN the NEMA committee on the promotion of adequate wiring gets under way with its campaign the first of the year, it will find a number of agencies already at work. Certain of the wiring supply manufacturers have been engaged in public education for some time. A number of leagues are promoting Red Seal wiring. Inspector groups in certain localities are active. A number of power companies are selling adequate wiring or additional wiring. A number of agencies interested in one or more phases of better housing are emphasizing the adequacy of wiring. And, believe it or not, there are a powerful lot of electrical contractors who are selling more complete wiring to owners and builders.

Almost all of these efforts can be coordinated so as to provide an organized front. The industry is rapidly awakening to the value of adequate wiring and, when the Wiring Design Handbook prepared by the Joint Industry Committee is distributed (it is promised for the first of the year), an even greater interest is expected.

There is probably no other single program in which the industry can engage that will be so effective in building business for all as adequate wiring. No commodity program can advance very far until the wiring problem is solved.

Fortunately, NEMA is starting with a small appropriation rather than a large one. In this way the program can grow and develop in the right direction without fear of criticism in its early stages of lack of progress.

Owner Salary

DURING the depression few contractors paid much attention to overhead in making a bid, but now that construction is again becoming active, it is essential that this item be covered properly if the business is to be profitable.

The first item of overhead, or cost of doing business, is office and management salaries. In this item must be included a salary for the owner of the business if he is active in the business. Too many contractors are content to pay their bills and take what is left for themselves, calling it profit. This is not right.

Every contractor should carry for himself on his books a salary that is at least equal to the amount he would have to pay someone else to do his work. The balance that is then left will represent the true profit.

Black Pipe

FOR many years there has been pressure placed upon conduit manufacturers to eliminate black pipe and produce only galvanized. This movement was led by the N.E.C.A., and now come the inspectors, with the endorsement of the wholesalers, recommending a change in the next Code whereby white only will be recognized as an acceptable material.

The contractors urged the elimination of enameled conduit on the grounds of economy. They argued that duplicate stocks increased their costs and that concentration by the producer on one type would reduce manufacturing costs. The inspectors attack black pipe on the basis of safety, claiming that the enamel on black pipe is chipped off leaving the conduit unprotected against corrosion at these points.

The manufacturers realize that the trend is definitely toward white pipe. Ten years ago black accounted for 65 per cent of the production against 35 per cent of white. Today the figures are exactly reversed. Some have already seen the handwriting on the wall, and are no longer making any black. The conduit manufacturers, on the whole, however, see some objections to taking the step at this time.

It is pointed out, for instance, that in certain places, particularly where there are sulphurous conditions, black gives a better account of itself than white. There is also the danger, they claim, that with an all white standard there will be more substitutions of water pipe because of the difficulty the inspector will have in distinguishing between the two. Nevertheless, the Rigid Conduit Manufacturers have gone on record as being willing to cooperate with the industry in this matter provided it can be shown that the step will not increase the cost.

All in all, therefore, it would appear as though there were better chances for securing a single standard rigid conduit than ever before.

More Inspectors

ELECTRICAL inspectors are now trying to make almost twice as many inspections per man as they did in 1929. This, which is but one of the significant facts brought out in the survey of inspector operations appearing elsewhere in this issue, should cause electrical contractors to pause for a moment to consider the effect upon their business.

If wiring ordinances are worth while to electrical contractors, it can only be because of the inspection feature. How can an inspector do a proper job when he has to make nearly one hundred inspections per week? Surely only the most superficial examinations can be made by men under such pressure.

The chief inspectors know that their departments are undermanned and have tried to get the situation corrected. Their progress in this direction will be slow indeed without the help of the electrical industry. The cities cannot now claim that the inspection departments are being operated at a loss for many of them are showing handsome surpluses.

Moreover, the demand for inspections should increase as building improves. It is, therefore, all the more important that contractors give their inspection departments all the assistance they can in order to secure more man power.

Buyers Reference Number

WITH this issue, we present as Part 2 the annual Buyers Reference Number, thoroughly revised to take care of the thousands of changes in supply sources. The many uses to which this directory can be put have been most encouraging and it is the ambition of the publishers that this annual service to **Electrical Contracting's** readers will come to be an indispensable tool of the electrical construction industry.

N.E.C.A. News . .

Material for this department is supplied by the headquarters staff of the

National Electrical Contractors Association

420 Lexington Avenue, New York, N. Y.

President	Vice President	General Manager
E. N. Peak	Louis Kalischer	Laurence W. Davis
1603 West Main St.	17 Bergen St.	420 Lexington Avenue
Marshalltown, Ia.	Brooklyn, N. Y.	New York, N. Y.

Feeley Represents New England on Executive Committee

The Executive Committee has appointed James A. Feeley, president of the Barnes-Pope Company, 98 Brookline Ave., Boston, Mass., executive committeeman to represent Division 1 (New England) for the one-year period until the next annual convention of the Association. Mr. Feeley has served as president of the Boston Metropolitan Chapter, N.E.C.A., and is now treasurer of the present Electrical Contractors Association of Greater Boston.

The appointment of Mr. Feeley by the Executive Committee resulted from the failure of New England to be represented by voting membership at the recent Atlanta convention. This appointment now completes representation on the Executive Committee from the twelve geographical divisions of the Association.

New Membership Classification Plan Effective January 1

The new classification plan for dues has been made effective January 1. The ten classifications are based upon the gross sales billed by the member in his electrical contracting and retail merchandising business in the twelve months' period preceding the month in which his application for membership is submitted, or preceding the first of the month following the expiration of his previous year's dues. The classifications and dues follow:

Class	*Volume of Member's Business*	*Annual Dues*
A	Under $25,000	$15.00
B	$25,000— 50,000	25.00
C	50,000— 100,000	50.00
D	100,000— 150,000	100.00
E	150,000— 200,000	125.00
F	200,000— 300,000	150.00
G	300,000— 400,000	200.00
H	400,000— 700,000	300.00
I	700,000—1,000,000	400.00
J	Over 1,000,000	500.00

Members who joined the Association after January 1, 1935, will pay the new dues upon the anniversary of their membership. Those who joined prior to that date will pay the new dues starting with January 1.

A discount of 5 per cent will be allowed where the annual dues for the second or any subsequent year of membership are paid in full in cash within thirty days of their due date. An installment plan for paying the new dues has been set up whereby the first installment is paid in cash and the balance in two notes of four and eight months' duration each. The manner in which dues may be paid is outlined in the following table:

	Installments		
	1st	2nd	3rd
Annual Dues	Cash	4 Months Note	8 Months Note
$ 15.00	$ 5.00	$ 5.00	$ 5.00
25.00	10.00	7.50	7.50
50.00	20.00	15.00	15.00
100.00	40.00	30.00	30.00
125.00	55.00	35.00	35.00
150.00	70.00	40.00	40.00
200.00	100.00	50.00	50.00
300.00	150.00	75.00	75.00
400.00	200.00	100.00	100.00
500.00	250.00	125.00	125.00

WIRES HOUSING PROJECT: The Federal Housing project for Columbia, S. C., is keeping E. L. Cashion, Cashion Electric Co. of that city, on the run for skilled mechanics. With a new court house, several school jobs, a large out-of-town residence, and other work under way, this $24,000 federal contract rounds out a big year for his company.

Some N.E.C.A. Membership Benefits

Membership Materials (free)

NECA Manual of Labor Units
(With monthly estimating data service)
Electragists' Estimating Manual
Simplified Business Record System
Handbook of Interior Wiring Design
"The Qualified Contractor" monthly bulletin
Subscription to ELECTRICAL CONTRACTING
Identification as a *Qualified* electrical contractor

Bulletins and Advisory Services (free)

Survey of Prevailing Wage Rates in 1,000 Cities
Voluntary Agreement of Fair Competition
Plan of Bidding Practice
Social security bulletins
Information on licensing and inspection laws
Directory of Local Contractors Associations
Organization and operation of local associations

Business Helps (available at cost)

Estimating forms and take-off sheets
Job Record forms
(Job envelopes, payroll and material records)
Uniform Proposal forms
Standard Accounting System
(Special accounting forms)
Manual of Accounting Practice
Simplified Business Record forms

Important Committee Activities

Distribution and trade relations
Electrical industry promotion
National Electrical Code
Adequate wiring promotion
Highway crossings signals
Rural electrification
National Motor Section
Robinson-Patman Act

Plans for 1937 Convention Tour

Dates for the 1937 convention to be held in Los Angeles, Calif., have been set for October 18 to 21, inclusive, which will allow one more day for convention sessions than has been the usual custom.

Plans have been made for an "all expense" tour by special chartered train for eastern delegates and their families, to include stops at the Grand Canyon and Boulder Dam en route to Los Angeles, with five days in the

···ADEQUATE *and* ECONOMICAL *for both*··

When it comes to wiring devices—the P&S-DESPARD Line is your best bet.

Modern and adequate for the most elaborate layout—yet its many savings over the old method of wiring bring the cost of installation down low enough to permit its use even in the most modest home.

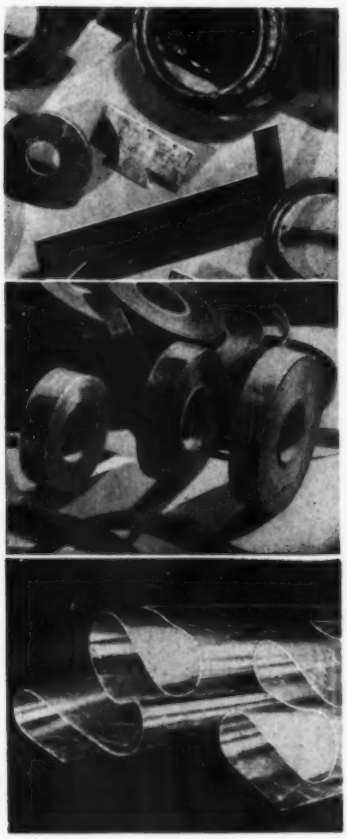
And remember—when you install the P&S-DESPARD LINE everyone profits—builder . . homeowner . . and electrical contractor.

Get the story today from your nearest jobber.

P&S-DESPARD WIRING DEVICES

P&S **PASS & SEYMOUR INC., SYRACUSE, N. Y.**

UMI



MICABOND

Mica in its most usable form

MICABOND is supplied in various forms of molding plate, segment plate, heater plate, flexible sheets, tapes, tubing and punched or formed parts, such as "V" rings, washers, segments and other special shapes. These forms of MICABOND possess varying characteristics—properties which have been brought out to meet specific insulating needs. In MICABOND plate, there are nine distinct types—each made to fit a particular general application.

For insulating armature coils, turbogenerator coils, and other applications where a flexible insulation of high resistance is required and for emergency repairs in many types of apparatus MICABOND Tapes are efficient and easily handled.

There is a type of flexible MICABOND Sheet for every requirement where pliability without heating is needed. For the making of "V" Rings there is MICABOND Molding Plate which can be readily molded into almost any shape by heating. Upon cooling it becomes rigid and firm. For cutting segments there is a special grade of MICABOND Plate milled to within plus or minus .002" and which will not ooze, slip or otherwise change its shape under heat and pressure.

Send for a copy of the complete MICABOND catalog. You will find it useful.

CONTINENTAL-DIAMOND FIBRE COMPANY

NEWARK, DELAWARE

HEADS CALIFORNIA LICENSE BOARD: Roy N. Butcher, San Jose, Cal., electrical contractor, has been named chairman of the California State Contractors License Board. Mr. Butcher has been a prominent electrical contractor in Northern California for many years and has served as executive committeeman on the Northern California Chapter, N.E.C.A. The board which he heads consists of general and engineering contractors and subcontractors. Enforcing the provisions of the act are a staff of 23 inspectors throughout the state of California. New regulations recently adopted by the Board require applicants for contractors' license in the State of California to name sponsors for their business integrity, thus raising the business of contracting somewhat toward the goal of a profession in that State.

Secure copies of this I. A. E. I. Booklet For Your Customers

Stamp your name on it and build good will

No customer who receives a copy of this booklet on how to take proper care of electrical equipment in his home, will fail to appreciate your courtesy in sending it to him. The booklet contains information that he has never received elsewhere. It points out the hazards of handy-man wiring and make-shift repairs, and suggests that additions be made only by authorized contractors.

SEND FOR A FREE SAMPLE COPY!

Then place an order for enough to supply all of your present and past customers.

PUBLIC RELATIONS COMMITTEE
85 JOHN STREET NEW YORK, N. Y.

convention city, and a return trip with proposed visit to Yosemite Valley, two days in San Francisco, a day in Portland, with a visit to Bonneville Dam on the Columbia River, and a day in Seattle, returning east via the northern route.

Rates for this all-expense tour which include every expense on the trains, hotel accommodations, and meals at all stopping points, excepting meals in Los Angeles, and all side trips including buses and other accommodations, will be within the following outside prices:

Two persons in room with twin beds and bath all hotels
One person in lower berth on trains $298
Two persons in compartment 318
Single occupancy in hotels approximately $12.00 additional.

The special train will start from Chicago on October 12 with special excursion rates applying to all starting points east of Chicago. The trip as planned will occupy twenty days, bringing the delegates back on October 31.

New Columbus, Ga., Chapter

Five firms have recently formed a chapter of N.E.C.A. in Columbus, Ga., with officers as follows: John M. Flournoy, president; Deronda Levy, vice-president; and Willis Radcliff, secretary-treasurer.

The Most Valuable Corner in the World

—to Electrical Contractors and Plant Electricians:

● Fifth Avenue and 42nd Street, New York City is credited with being the most valuable corner in the world but it can't compare with the value of the little coupon at the bottom of this page.

● To electrical contractors, service shop owners, industrial plant electricians, that coupon offers an unparalleled service in the monthly issues of Electrical Contracting.

● With its heritage of more than thirty-five years' service to electrical men —with such other McGraw-Hill publications as Electrical World, Factory Management and Maintenance, Power, and Electronics to draw on—Electrical Contracting is qualified to offer accurate information about wiring methods with a breadth and authority denied any single electrical publication.

● Electrical Contracting offers electrical men the latest information about:

—residential, commercial and industrial wiring methods
—approved bidding and estimating practices
—ideas on handling motor repair shop work
—wiring hazardous locations
—installation and maintenance of industrial wiring
—wiring to meet electrical code requirements
—ways to save time and money on large and small jobs

● Whether you are an independent residential, commercial or industrial electrical contractor, a plant electrician, or a service shop operator, you'll find Electrical Contracting answering your electrical questions out of the experience of other men who have successfully solved those self-same problems.

Use the coupon below to order a personal subscription to Electrical Contracting for your use and profit in 1937!

Put yourself in line to get this valuable monthly aid by filling-in and mailing "The-Most-Valuable-Corner-in-the-World"—RIGHT NOW. A full year for only $2 or, better yet, two years for only $3. *Send no money now.* Pay when we bill you.

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Enter my subscription to *Electrical Contracting* for 2 years at the special "*money saving*" rate of $3
Start service with the January issue and send bill to:

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Contracting . . . . News . . . . . .

Carolinas' Association Wants State Law

The first convention of the Carolinas' Association of Electrical Contractors was held at Winston-Salem on November 17. The program included the passage of the constitution and by-laws, presentation of a new code of ethics, and a proposed state licensing law to be presented to the next session of the North Carolina legislature.

The association now has local chapters in nine cities in North Carolina and one city in South Carolina.

An industry council is being promoted by the association to consist of five contractors, five wholesalers and five utility representatives. The contractor members have been appointed by the association and, as soon as the other two groups name their representatives, the council can begin to function. Its activities will include the planning of a program of cooperation and better trade relations, elimination of practices detrimental to each other's interests, and the development of a better market.

REA Favors Inspection of Farm Wiring

In a recent bulletin entitled "Electrifying Your Farm and Home," sent out to farmers to encourage the use of electricity, REA encourages electrical inspection and installation by experienced contractors. The statement on this point reads as follows:

"You will save both money and trouble if your wiring is installed by a contractor thoroughly experienced in farm wiring. When the job is finished, it should be checked by an electrical inspector. Make sure your wiring installation is safe and adequate for all your needs."

Ohio Association Adopts Tentative Legislation Draft

Following an open general meeting held in Cleveland on the evening of October 21 as a conclusion to an all-day session of the Ohio Electrical Contractors Association, Inc., a tentative draft for proposed legislation was prepared on October 22 that contains provisions of both the NEMA "Model State Law" and the present Michigan State Law. The proposed bill covers inspections, installation standards, licensing of electrical contractors and journeymen, and control of electrical materials sold at retail.

A second general open meeting was scheduled to be held at Columbus on December 2 and 3 for the purpose of discussing the bill with all interested groups who are represented. Invitations announcing this meeting were mailed out November 16.

I.B.E.W. Says Contractors Can Now Insist on Union Materials

Cooperation by employers of union electricians in the purchase of materials bearing the I.B.E.W. label has been asked by the International Brotherhood of Electrical Workers. A letter to these contractors, over the signature of D. W. Tracy, president, and dated November 16, points out that local unions of the I.B.E.W. have established contractual relations with a number of manufacturers and that "this fact makes it possible for you to now insist upon all electrical materials—employed in your electrical construction work—being union made. Such materials bearing the I.B.E.W. label can now be purchased from manufacturers who employ our members." A list of approximately 28 manufacturers accompanied the letter.

Mr. Tracy concluded his letter with the following statement: "I am certain that which intelligent organizations have always striven for, namely conscientious industry consciousness, can be more rapidly achieved for the electrical construction industry through the reciprocal cooperation now made possible."

NEMA's Four-Point Wiring Program

There are four elements to the NEMA program for adequate wiring promotion, as explained by O. C. Small, director NEMA Business Development Department, to the first annual meeting of the International Association of Electrical Leagues held in Cleveland on November 20 and 21: National publicity, a local plan, selling and financing. A committee is now being named to work out the details.

The session on adequate wiring was opened by C. E. Swartzbaugh, chairman of the NEMA Business Development Committee, who stated that since there is a need and the time is right, an aggressive cooperative program can be put across.

E. A. Brand, chairman of the Industry Committee on Adequate Wiring, outlined the contents of the new Wiring Design Handbook which is expected to be off the press shortly. He also raised the question of why other product campaigns have not pushed wiring because the lack of it is holding back the market.

One significant trend of thought on this subject was touched on by Mr. Small, namely the necessity for flexibility in standards, maintaining the high industry standards for the larger residences with modifications to fit houses in the lower price brackets.

Other speakers on this subject emphasized the need for selling promotion based upon the public needs.

This first meeting under the chairmanship of President J. E. North discussed the national and local phases of the industry promotion programs, kitchen modernizing, Better Light-Better Sight, and electrical housewares.

At the conclusion of the meeting,

Nearly 100 league and industry representatives attended the league association round-table

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QUADRUPLY OK'D
In Buckeye Steel Conduit the architect gets a dependable, known quality which never varies. The owner gets maximum durability. The journeyman gets easy workability which lightens his labors. The contractor is assured trouble-free installation which keeps his costs to a minimum. All four benefit when BUCKEYE CONDUIT is used throughout a job.
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BURNDY TAPITS
Before you can say,
JACK ROBINSON!
Note Canvas-Bakelite cover (part of the connector itself)
Using nothing but a wrench and a Burndy Insulated Tapit (Type PG), *any* workman can make a first-class cable tap before you can say, "Jack Robinson!" Best of all, the Tapit makes the dangers and difficulties of soldering in close quarters a thing of the past. Result: Faster installations! Lowered labor costs! Safer, more efficient connections!
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Portable Lamp Guard
with Rubber Hook Handle
A tough, robust guard that stands up under a lot of knocking around. Solid rubber hook handle protects workmen against shocks. Heavy, welded steel wires prevent lamp breakage. Hooks increase convenience. Available with or without thumbswitch or reflector. Just one of the wide McGILL line. Order today.
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Ralph Neumuller, New York, was elected president; George Conover, Philadelphia, vice-president; A. A. Gray, Chicago, treasurer; and O. C. Small, secretary.

Heavy Engineering Work for California Contractors

Electrical contractors are doing the big installation work for the Metropolitan Water District bringing Colorado River water over mountain ranges from the Colorado River to the southern California region. Practically all of the transmission lines built for the Metropolitan Water District construction were erected by electrical contractors. Fritz Ziebarth, Long Beach electrical contractor, is now constructing a permanent 230-kv. power transmission line for the pumping plant near the Parker dam and to Iron Mountain for a second pumping plant. The line is 193 miles long.

The installation of the huge pumping plants, probably some of the largest in the world, will be made by H. H. Walker, Los Angeles, electrical contractors. The contract is for three of these huge pumping plants and work has begun. The largest of the electric motors at the Hayfield pumping plant will have a rating of 12,500 hp.

Industry Business Development in Minnesota

A new business development committee composed of representatives of all branches of the industry and to be known as the North Central Associated Electrical Industries, is being formed in Minneapolis under the sponsorship of the contractors' association, the Minnesota Electrical Council to stimulate and develop business through local and national promotions on wiring, lighting, appliance sales, etc. Offices are at present being shared with the Council in Minneapolis, Minn.

A suggested program which has not yet been finally approved, contemplates the following activities:

1. Maintain wholesaler-dealer-consumer system of distribution, and aid members who are in competition with the cooperative buying movement.
2. Improvement in such practices as trade-in allowances, retail sales at wholesale prices, etc.
3. Set up uniform installation standards and develop adequate and economical wiring methods. Establish uniform accounting and estimating procedure.
4. Coordination of national promotion programs, such as electric kitchen modernization, Red Seal wiring, Better light-Better Sight, etc.
5. Special promotion programs of any group represented in association.
6. Association emblem for display and advertising purposes.
7. Coordination of dealer activity with utility sales efforts.

NEWS

FOR THE READERS OF ELECTRICAL CONTRACTING

A New Department starting in this issue

MAINTENANCE

Bringing together in one section the following activities:

- **MODERNIZATION**
- **REPAIRING**
- **SERVICING**

OF COMMERCIAL AND INDUSTRIAL WIRING, LIGHTING AND POWER EQUIPMENT

SEE PAGES 33 TO 40 INCLUSIVE

8. Electrical contractor and dealer standards, sales and service schools, store and display modernization.

9. Promote favorable legislation and combat that which is unfair to any branch of the industry.

10. Clearing house for complaints within the industry group.

In announcing this organization activity, William A. Ritt, secretary-manager of the Minnesota Electrical Council, expected to have the association in operation by December 1, and thus tie together all branches of the industry in the state. It is hoped that such a coordinated movement will help solve the present serious lack of qualified electrical contractors in the rural electrification areas.

S. B. Williams Goes to Electrical World

S. B. Williams, who has been editor of ELECTRICAL CONTRACTING and its predecessor, *The Electragist*, since 1924, has joined the staff of *Electrical World* as managing editor. He is succeeded as editor of ELECTRICAL CONTRACTING by Earl Whitehorne.

Under Mr. Williams' editorship ELECTRICAL CONTRACTING magazine has taken a prominent place in the prog-

S. B. Williams

ress of the industry. When he resigned the editorship of *Electrical Record* in 1924 to manage and edit *The Electragist*, he undertook the publication of the first magazine in this country devoted entirely to the interests of the whole electrical construction industry. Prior to that time *The Electragist* had, for twenty-three years, been published for the members of the Association of Electragists.

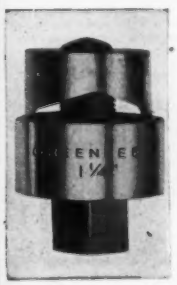
When the magazine was purchased by the Electrical Trade Publishing Company in the fall of 1928 and moved to Chicago, Mr. Williams continued as editor.

GREENLEE
PROFIT MAKERS
For The Electrical Contractor

THE greater the efficiency of the tools you use, the more chance you have of meeting competition and making a profit on each job. That is why Greenlee Conduit Benders and Knockout Tools are so popular. They cut costs on every job and are liked by the men who use them.

Hydraulic Conduit Benders

Greenlee Hydraulic Conduit Benders insure profits, because they bend conduit quicker and easier than by other methods. In addition, they make smooth, even bends, eliminating many fittings and making it easy to pull in wire and cable. They are easy to take to the job, too, because they are readily portable.



Knockout Tools

Greenlee Knockout Punches and Cutters are time savers and profit makers, because they make it easy to enlarge holes in switch boxes, cabinets, etc. They form clean-cut holes quickly and accurately, without any reaming or filing.

Other Tools

Hydraulic Pipe Pushers
Joist Borers **Bit Extensions**
Electricians' Bits

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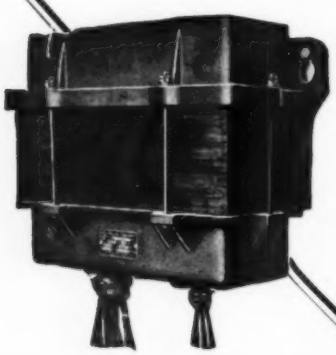

Type CFT three-phase, outdoor-type, air-cooled transformer

Types CF and CFT

- Air-cooled—no oil nor fireproof vault.
- Conduit Fittings—easy to install.
- Single-Phase or Three-Phase types.

AmerTran Air-Cooled Transformers and Auto-Transformers reduce operating costs . . . they may be used on single- or three-phase circuits for supplying 115/230 volts for lighting or power from 230-, 460-, 575-, or 2300-volt power circuits so that advantage may be taken of the lower power rates. Other standard types are furnished for phase-changing, voltage boosting and operating low-voltage equipment. AmerTran is also prepared to furnish many other types of transformers, including types for distribution, power, testing, welding, etc. May we have the opportunity to send information on equipment to meet your requirements?

Type CF single-phase, outdoor-type, air-cooled transformer

AMER TRAN

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160 Emmet Street
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During the twelve years of Mr. Williams' editorship ELECTRICAL CONTRACTING has devoted itself to giving its field a leadership consistent with the best principles in publishing. It has been fearless in its opposition of what it believed to be against the best interests of the electrical contractor. It has promoted many programs which it knew would ultimately contribute to the advantage of its industry. It has encouraged the expansion of the opportunities of the contractor and has been tireless in interpreting the economic functions of the contractor to the rest of the electrical industry.

Now Mr. Williams returns to *Electrical World*, the publication on which he spent the first eight years of his editorial efforts, where he will have increased responsibilities, and an opportunity to expand his editorial leadership to other branches of the industry.

The Electrical Guild of Chicago Holds Meeting

A dinner meeting of the Electrical Guild was held in Chicago, Ill., on November 23 at which about 100 local electrical contractors were reported in attendance. The purposes of the Guild, as outlined at the dinner meeting by Sydney R. Drebin, attorney and executive secretary of the Guild are: (1) The development and fostering of good will among electrical contractors; (2) negotiations with wholesalers to develop proper differentials between contractors and consumers; and (3) cooperation with electrical inspection authorities for rigid enforcement of the electrical code, and to stop individuals and chisellers from doing wiring. A. Oppenheimer, president, introduced the following speakers: Leo E. Mayer, past president of N.E.C.A., J. Norman Pierce, executive committeeman, N.E.C.A., A. A. Gray, Electric Association of Chicago, and others.

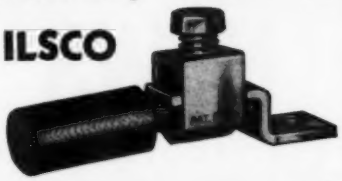
Cooking Unit Efficiency

That the efficiency of surface electric cooking units drops on increased voltage, rather than dropping as the voltage becomes lower, is pointed out by H. J. Mauger, whose article "Electric Cooking and Water Heating" appeared in Electrical Contracting, October issue. A set of curves which appeared with this article bear out this corrected statement. The article as originally worded reversed the actual conditions.

The reason given by Mr. Mauger for this lowered efficiency is that a greater heat loss takes place through radiation as the temperature in this particular unit increases, and because the utensil is not able to absorb the energy rapidly enough in doing the work required.

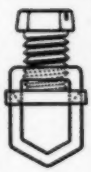
SIMPLE, ISN'T IT?

ILSCO



SOLDERLESS CONNECTOR

NOTICE: The *triangular wedge* formed by the tang and V-bottom collar, which forces the wire into a *solid mesh*—
NO set-screw contact . . .
NO flattening or separating of wires . . .
NO limitation to one size wire . .
NO shearing effect whatsoever . .
NO special tools required to make connection . . .



NO need for you to search any longer for the PERFECT Solderless Connector—WE HAVE IT!

Ilsco solder lugs show the size of the largest wire they will take.

FREE—A large display board, containing mounted samples of ILSCO lugs. Sent upon request.

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On these dark December days your industrial customers are lighting conscious.

Sell them the advantages of better lighting with MULTI STANDARD DOME REFLECTORS.

These are high quality porcelain enameled units with positionable sockets that will give years of efficient lighting service.

You will profit by selling MULTI PORCELAIN ENAMELED REFLECTORS.

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A Roll o' Tape

Field notes about men of the contracting shop, and inspection branches of the industry

AN OPTICIAN'S reading chart serves as a visibility test under varied types of industrial lighting in the equipment display room of the Pacific Electric Motor Co., Oakland, Calif.

AN industrial get-acquainted campaign that was recently conducted by M. J. Torrance of Rock Island, Ill., brought 125 industrial plant representatives to his display room, where talks were made by experts on seven groups of exhibits that had been specially assembled for this gathering. The modern Torrance Motor Service Shop was also a part of the show.

ONE uncommon and puzzling problem is that of Peter Winston, Winston Electric Construction Co., Richmond, Va., who as treasurer of the local NRA wound up with a cash surplus. He can't decide on the proper procedure to dispose of funds that were deposited in the name of what is now a non-existent agency.

PROOF that graphic instruments have a place in the equipment of an industrial contracting organization comes from "Jack" Davidson, Davidson Electric Co., Brooklyn, N. Y. This company's graphic recording wattmeter is never at the shop, but is kept in service the year round in factories. Efficiency and load tests are made for customers on doubtful motor drives, overloaded feeders, services, transformer stations, etc.

TO prove that modern newspaper presses can be wired neatly without resorting to the conventional layout of lengthwise wireways, Morris Hunter of Richmond, Va., recently completed a $10,000 newspaper plant modernization job in which he developed a layout for all the motors, controls, and lights

No. 330 "LATROBE" TOM THUMB UTILITY OUTLET

For use in wood installations, and other locations free from moisture or mechanical injury.

Fewer parts = less man-hours

—and it adds up to greater profit!

Simplified construction makes every Latrobe floor box and wiring specialty easier to install. And with fewer parts to get out of order, there are no costly "service" calls after the job is completed. Install Latrobe on your next job—you'll appreciate the difference.

FULLMAN MFG. CO. LATROBE PENN.

No. 130 "LATROBE" ADJUSTABLE WATER-TIGHT FLOOR BOX

No. 130 Box with No. 207 Bell Nozzle. Cut-away view illustrates how tapered unit receptacle fits tapered opening in adjustable ring. Design eliminates many small parts. Cover plate 3½"—overall height 3½".

No. 285 DOUBLE DUPLEX RECEPTACLE NOZZLE

The most attractive, compact and easy-to-install fitting on the market. Shown in illustration with No. 200 Cover Plate.

No. 110 "LATROBE" WATERTIGHT BOX

Cut-away view of No. 110 Box showing how the tapered unit receptacle fits tapered opening in top of box body. The last word in design, appearance, and simplicity of installation.

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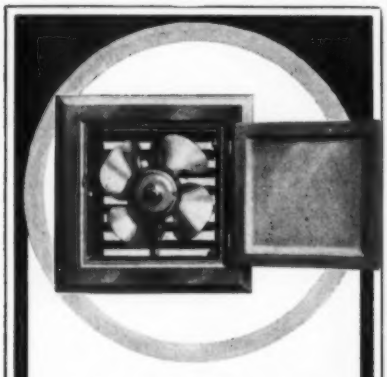


Automatic Wall Box Kitchen Ventilator Fan

Built-in type for permanent installation, it is telescopic in design, adjustable to wall thickness 7" to 13". No wood or metal frame or screws in the plaster, wood, or brick necessary. Inside and outside polished cast aluminum; wall box rust resisting steel. Quickly installed in old or new homes. Automatic switch and shutters controlled by opening and closing of the door. 10" silent blade fan; available for A.C. or D.C.; A.C. non-radio interfering. Write for bulletin and prices.

SIGNAL ELECTRIC MFG. CO.

Menominee, Michigan, U. S. A.

OFFICES IN PRINCIPAL CITIES

SIGNAL

that utilized exposed rigid iron conduit and threaded fittings.

ALTHOUGH electrically heated equipment is not being provided at this time, the kitchen in a new hospital at Raleigh, N. C., is being provided with a 300,000 cm. feeder and panelboard to avoid expensive future wiring costs. The Thompson Electrical Co. is responsible for this installation.

WHEN the size of switch plates in better homes is reduced by using the compact 3-per gang switches, W. Worth Summers of the Electric Service Co., Raleigh, N. C., advises the use of 4-in. square outlet boxes for greater ease of making connections.

THE NEW front for the enlarged quarters of the Levy-Morton Co., Columbus, Ga., includes a panel of luminous glass bricks above the transom using a 3-color lighting system therewith. Deronda Levy announces that it's now time for contractors to modernize.

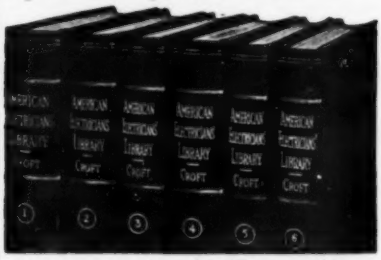
AN example of how valuable floor space in crowded Manhattan may be utilized is the 8½-ft. by 40-ft. motor service shop of the H. J. Electric Co., Inc., New York, N. Y. Four men can work comfortably in this space, says H. Josephson, having handled over $800 of repair work in one month involving motors as large as 30 hp.

ALTHOUGH October 14 completed the fortieth year in the same business block of Richmond, Va., for W. H. Jenks, he doesn't depend on customers to look him up. Mr. Jenks believes in outside personal sales effort. Neat fixture displays which occupy 10 separate rooms are under the control of four store employees, one of whom has seen thirty-seven years in the organization. A 38 foot-candle re-lighting and wiring job which Mr. Jenks sold to a large store this year is said to be Richmond's brightest spot.

RURAL electrification that is done by high school boys and "overnight" village electricians means not only a loss to the established electrical contractors, says W. Worth Summers, Electric Service Co., Raleigh, N. C., but the sales opportunity for appliances and farm equipment is also reduced. These boys make no attempt to sell an adequate layout, but are content to wire for just the minimum that a farmer decides he needs. Perhaps state licensing legislation deserves also the support of the other interests who expect to cash in on adequate rural wiring, surmises Mr. Summers.

The easiest way to get ahead in electricity—

through the other man's experience as found in books



Whatever "getting ahead" means to you as an individual, there is no principle so important as backing up your brain with the other man's experience. Why spend time and effort to find out what has already been learned and put down for all to see in books? Here, for instance, are all the results of a rich experience in every stage of wiring, installation and contracting work gathered and set down for you in

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The books show the best ways to make installations for every type of conduit wiring job—they tell how to handle every kind of lighting and switch problem—they give tips on short-cuts for saving time on routine jobs—they show the quickest and surest methods of locating and remedying circuit troubles. Alternating current armature winding, electrical machinery control diagrams and machinery erection are some of the things covered in detail.

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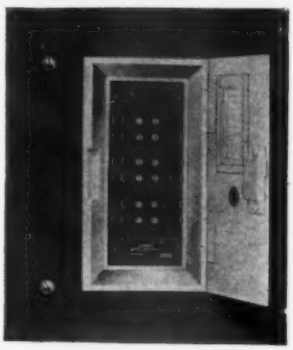
New Products . . for December . . .

Multi-BreakeR Panelboards

A line of Multi-BreakeR lighting panelboards utilizing Multi-BreakeR units to provide compactness and small size. The boxes are only 15 in. wide and 4 in. deep, permitting installations in spaces heretofore not available for mounting wider panelboards. Trims are furnished in a combination of academy brown and golden



wheat tan with exterior hardware chromium plated. Boxes are galvanized, with knockouts in the top and bottom. Wiring gutters are 4 in. wide. These panelboards are supplied with from 4 to 40 circuits in two-circuited groupings for 115, 115/230 volts a.c. service. Mains can be arranged for either single-phase, 3-wire solid neutral or 3-phase, 4-wire systems. Single-pole (2-wire, solid neutral) branches are obtainable for 15, 20, 25 or 50 amp. Circuit designations and a directory card are provided. Square D Co., Detroit, Mich.

Combination Diffuser Units

A line of porcelain enameled steel reflectors designed to have lighting characteristics similar to conventional Glasteel diffuser units, but which accommodate a combination of one 250-watt H.I.M.V. lamp and either one or two incandescent lamps. These units include a steel dome type reflector, a diffusing globe of opal glass and an oxidized Alzak

aluminum auxiliary reflector in the hood. Apertures are provided in the top of the reflector for directing approximately 10 per cent of the light toward the ceiling, while a special ventilation design is said to prevent excessive operating temperatures. Benjamin Electric Mfg. Co., Des Plaines, Ill.

Interchangeable Motors

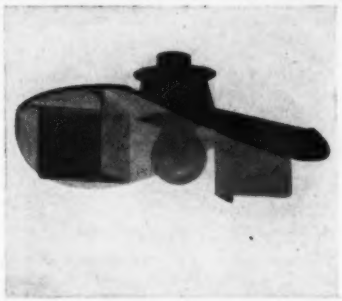
Riveted-frame squirrel-cage polyphase induction motors, in frame sizes of from 1 to 15 hp. at 1,800 r.p.m., available in a variety of electrical and mechanical modifications, which are said to incorporate improvements in stator-coil insulation, frame construction, and other design features. Interchangeable for many types of power supplies and for various applications requiring open, sleeve or ball-bearing, enclosed, enclosed fan-cooled, splash-proof, vertical motors, etc.

A new insulation system "built from the inside out" is employed for the stator coil windings, which are of the random-wound type, with joints at the connections fused instead of soldered. Insulating materials and processes are utilized which eliminate taping the end windings, and producing an insulation

assembly for which high resistance to moisture, mild acids, alkalis, oil, and abrasion is claimed. General Electric Co., Schenectady, N. Y.

Bin and Stack Light

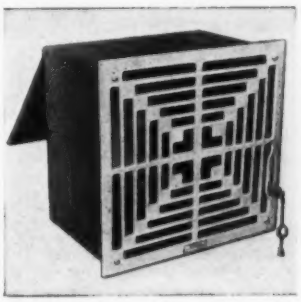
Designed to concentrate light on the vertical and horizontal surfaces of bins and stacks, for the proper illumination of book aisles, stock room bins and stacks, and wherever a distribution of light on a vertical plane is required. This bin and stack luminaire consists of a reflector and socket cover, with socket. The reflector is designed to direct more light to the working plane with two triangular vanes located opposite each other to provide proper eye shields, or light cut-off, up and down the aisles between the bins. The sides of the reflector are slightly dipped to redirect light into the bins and cut off stray light that would otherwise be lost. Made of 24-ga. Armco iron, finished white porcelain enamel inside, green outside and a black head. A steel outlet box cover arranged to take a standard sign receptacle socket is pierced and slotted for attachment to a 4-in. outlet box. Standard 60, 75 or 100-watt inside frosted lamps can be used. Westinghouse



Electric and Mfg. Co., East Pittsburgh, Pa.

Kitchen Ventilator

Two sizes of "Aristocrat" ventilators of the wall cabinet type, both designed



to be built into walls of any standard studding dimensions. Model No. 10 for medium-sized kitchens is rated 40 watts and 700 c.f.m. capacity, while Model No. 12, for large kitchens, is rated 50 watts and 1050 c.f.m. Design features include a mercury switch, a chain and lever operated outside door, polished aluminum grille, rust-proof steel cabinet, and quiet operation. Universal Blower Co., Birmingham, Mich.

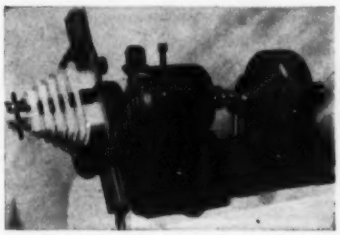
Pull Cord Extension Arm

Extension arm No. 85 is said to attach easily to Levolier switches for placing pull cords in the clear of reflectors,

shades and fixture bowls. Standard finishes, brush brass, Jap bronze and nickle. McGill Manufacturing Co., Valparaiso, Ind.

Concentric Coil Winding Head

A coil winding head that winds single-phase motor coils in gangs, or groups



up to six in a nest, in all sizes and shapes, connected in series, so that they can be removed together and inserted in the stator without series soldering.

After winding, the head is collapsed to permit the easy removal of the coils. It is adjustable for the length and width of coil, and can be set up for winding in from five to ten minutes. The unit has a base with a scale on the side and a flange for mounting the coil winder head on the drive. On this are mounted two adjustable face plates with adjustable aluminum segments over which the coils are wound. Ideal Commutator Dresser Co., Sycamore, Ill.

Rural Line Fuse Cutout

A suspension fuse cutout for use on 6900-volt "one-line," common-neutral circuits designed for hanging from a

"saddle" which is permanently attached to the line conductor. The Model 9F8A1 cutout consists essentially of a fuse tube, with a metal sleeve which is threaded into a "head," or terminal and clamp assembly, for connection to the line saddle. A switch hook is claimed to be the only tool required to lock the cutout in place or remove it. Positive indication of the condition of the fuse is given by a gravity-drop indicator at the lower end of the cutout. General Electric Co., Schenectady, N. Y.

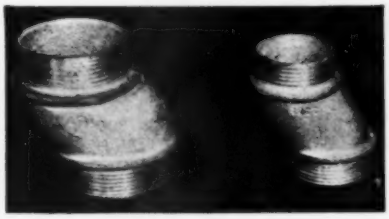
Phase Rotation Indicator

A small three-phase induction motor mounted in a bakelite case, with an indicating disc for determining the direc-

tion of rotation on a three-phase supply. Made for use on 110 to 550-v., 25 to 125 cy. systems. Portable models have three 30-in. leads, and clips of different colors. Ferranti Electric, Inc., New York, N. Y.

Offset Nipples

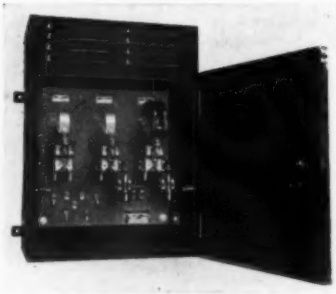
Nipples with offsets, for connecting switches to cabinets or wireways where opposing knockouts do not line up. Hartman nipples are made in ½-in. to 2-in. conduit sizes. All sizes measure 1⅛ in.



between knockout shoulders and provide approximately ⅞-in. offset. B. Hartman, Long Beach, Calif.

Adjustable-Range D.C. Starter

Type RD push-button controlled starters employ resistors which permit a range of from 5 to 25 h.p., 230-volt d.c. motors being properly started. By changing the manner of connecting a 3-coil resistor which is mounted on the top of the starter cabinet, the proper resistor value is said to be obtainable for any motors within this h.p. range. Adjustable mercury acceleration relays provide a time range of ½ sec. to 2 sec. per



step. Starter panel is hinged at the bottom to swing forward for access to wiring terminals. Optional features such as overload, field acceleration and field failure relays, and main line knife switch may be incorporated. The Electric Controller & Mfg. Co., Cleveland, O.

Explosive Area Motors

Type SK explosion tested, fan-cooled, totally enclosed, d.c. motors are available in sizes from 5 to 75 h.p. and 115, 230 and 550 volts. They are designed for use in locations where explosive gases or dust may exist. The brushes and commutator are readily accessible and the motor is designed with the fan on the commutator end so that a gear case, coupling, or pulley will not restrict ventilation. A double-walled bracket on the commutation end is equipped with hand hole covers which are readily removable

to permit inspection and adjustment of the brushes and commutators. These motors are designed, built and tested to withstand an internal explosion of gas (methane) or coal dust without injury to the equipment and without emitting flames or sparks which would ignite surrounding gas. Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

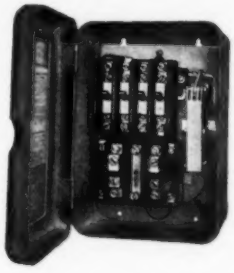
Rip-Cord Sheath Cable

The Hazard line of armored cable employs a rip-cord laid lengthwise between the paper sheath and the conductors to facilitate removal of sheath. A tug on the cord is said to strip the paper off with one motion. Bushings that are furnished with this cable have projections or fins which spring under a turn of

the steel armor to hold the bushing in place. Made in types AC, ACL, CA and armored ground wire, in four grades of insulation. Type AC can be had up to No. 2 4-conductor. Hazard Insulated Wire Works, Wilkes-Barre, Pa.

Magnetic Starter

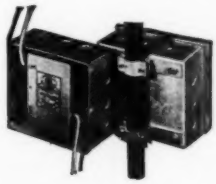
Type "C.M." magnetic starters and contactors for 1½ to 25 hp. single or polyphase motors employ relay heaters that are interchangeable from ½ to 80 amp. Self-cleaning and self-aligning



"wiping" contact action is featured. The complete mechanism is removable for wiring by loosening three screws. The Trumbull Electric Mfg. Co., Plainville, Conn.

Radio Interference Filter

Filterette OB–110 is said to eliminate radio interference that occurs during the



ignition period of electrically ignited oil burners. Designed for connection between the primary of the ignition transformer and the remainder of the oil burner wiring, the filter unit is contained in a 6-in. square metal cabinet which has mounting brackets for attaching the cabinet to the oil burner standards. Said to be safe for continuous operation on a.c. circuits, and without affecting the operation of the burner. Tobe Deutschmann Co., Canton, Mass.

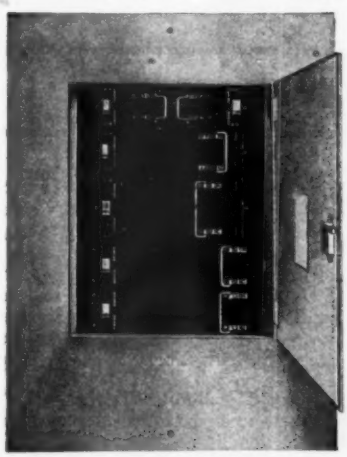
Rubber Clad Lamp Guard

The "Shokpruf" line of portable lamp guards employ a rubber handle and socket combination with a heavy steel guard that is covered with a 1/12-in. thickness of pure Latex live-rubber. Handles are designed to take all sizes

of portable cords up to ½-in. diameter yet leaving a watertight closure where the cord enters handle. Safety, weatherproof and jarproof design are featured claims. Packed in three pieces, ready for wiring and assembly. Frank W. Morse Co., Boston, Mass.

Heavy-Duty Panelboard

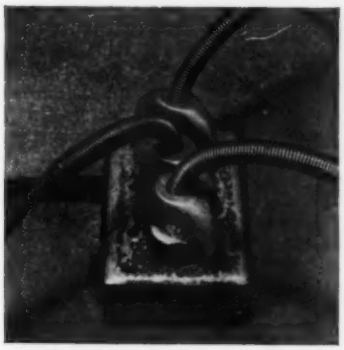
The "Swing-Wa" line of feeder and power distribution panelboards may be had in various combinations including branches up to 400-amp. capacity and up to 600 volts service. A simplified switching system is claimed for the branch circuit units in which the door of each unit is swung open by hand to disen-



gage the circuit contacts and to move them by sliding action from "off" to "on" positions. Other features include silvered contact surfaces, "Vystipe" fuse contact clamps, and thermostatic contact reinforcements for the "U"-shaped double break switch contacts. The Trumbull Electric Manufacturing Co., Plainville, Conn.

Strain Relief Yoke

A twist yoke assembly that is adaptable to any standard outlet box for locking extension cord caps into contact position. Said to assure permanent connections removed from all strain by a slight turn of the yoke that places its



locking pins in two counter-sunk holes provided in a punched box cover. Rubber gaskets for use under the cover exclude dirt from clogging the contacts. Covers furnished already punched for yoke locking pins, or old covers may be punched to order. Logan Sales Co., Los Angeles, Calif.

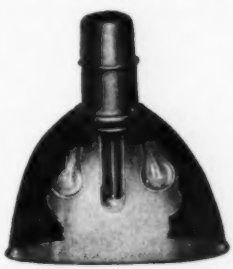
Commutator Slotter-Scraper

A hand tool for cleaning slots in commutators or for bevelling the slot edges after undercutting. Made with swivel type two-member tool bit head for working at the required angle. A screw is tightened to secure the tool bit and to

lock the notched faces of the adjustable head. The tool bit is hardened and sharpened for "V" cutting at one end and for "U" slots at the other end. Head, stem and handle are made of bronze. Ideal Commutator Dresser Co., Sycamore, Ill.

Combination Floodlight

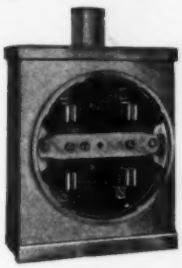
Open type floodlights combining mazda and H.I.M.V. lamps in one reflector, and designed for pole-top transformer mounting. Available in two reflector types, AL-45 and AL-46, each designed for two 150-watt mazda lamps and one 400-watt



mercury vapor lamp. The housing for the pole-top transformer that is used to regulate the mercury vapor lamp is made to slip over 1¼-in. and 2-in. pipe. This housing has adjustable fittings for supporting the floodlight. The reflectors are made of heavy sheet steel, finished with a double coat of baked enamel, and the holder, cap, and mounting fittings are of cast aluminum. General Electric Co., Schenectady, N. Y.

Meter Trough

Troughs for mounting from one to four type "S" prong meters in multiple. Made for indoor or outdoor installation



and supplied complete with terminal blocks and sockets. Trumbull Electric Mfg. Co., Plainville, Conn.

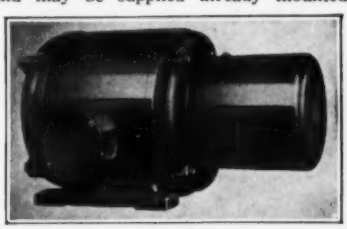
Fuse-Puller Switch

A line of Fuse-Puller switches for use on the mains, range circuits or branch circuits in service equipment combinations. Made in 30, 60, and 100-amp.

sizes for assembly with 2 to 8 plug fuse branch circuits in flush or surface type boxes. Trumbull Electric Mfg. Co., Plainville, Conn.

Motor Brake

A totally enclosed automatic solenoid brake for integral mounting on motors used with laundry, textile, woodworking and other machinery. Made for motors from fractional to 10 hp. (at 3600 r.p.m.) and may be supplied already mounted,



from the motor manufacturer. Rotating member consists of a single moulded disc which is suitable for a.c. or d.c. and may be had with dust-tight, weatherproof and water-tight enclosures. Cutler-Hammer, Inc., Milwaukee, Wis.

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Residence Wiring

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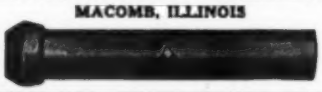
Bull Dog

Assembled Knob because it "HAS A GRIP LIKE ITS NAMESAKE."

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS



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Trade Notes . .

Youngholm Elected Vice-President of Westinghouse

David S. Youngholm was elected vice-president of the Westinghouse Electric & Manufacturing Co., at the last meeting of the board of directors. He will make his headquarters in New York. Mr. Youngholm joined the Westinghouse organization 27 years ago, his first position having been in the engineering department of the Westinghouse Lamp Co., after which he entered the sales department from which he rose to various executive positions.

Corning Glass Works Acquires Macbeth-Evans

The Macbeth-Evans Glass Co. of Pittsburgh, Pa., has been acquired by the Corning Glass Works of Corning, N. Y. The two Macbeth-Evans plants, located at Charleroi, Pa., and Elwood, Ind., will be operated as divisions of the Corning Glass Works.

Frederick Palmer

Frederick Palmer, vice-president of the Triangle Conduit and Cable Co., Inc., Brooklyn, N. Y., died on November 9 following an operation.

Mr. Palmer had been identified with the Triangle company since its formation in 1916, and was appointed in August of this year to the position of vice-president in charge of production.

H. Durant Cheever

H. Durant Cheever, chairman of the board of the Okonite Co., and president of the Okonite-Callender Cable Co., died of apoplexy in Paris, France, on October 23. Mr. Cheever had been chairman of the board of the Okonite Co. for ten years, and president for twenty years before that. Funeral services and burial took place October 25 in Paris.

The Emerson Electric Mfg. Co., St. Louis, Mo., announces the appointment of Irving L. Kordenbrock to the fan sales staff.

Leonard A. Hobbs has been named sales manager for the Northwest and western states in addition to northern California for the Smoot-Holman Co., Inglewood, Calif. Mr. Hobbs' headquarters will remain in San Francisco. Fred Smoot has been transferred from San Francisco to be placed in charge of a new office in Houston, Texas. The company also announces the appointment of the Cost Sales Corp. of Seattle, Wash., as agents for Oregon, Washington, Montana and Idaho. A stock will be carried in Seattle.

George H. Jump, engineer at General Electric's Buffalo, N. Y., office, has been appointed New England district engineer for the company, with headquarters in Boston, Mass. R. A. Jones of the Syracuse office goes to Buffalo as engineer, and Carl E. H. Von Sothen, engineer of the Schenectady local office, has been transferred to Syracuse.

Curtis Lighting, Inc., announces the assignment of Paul D. Cornelisen as its sales representative in the Michigan territory, with offices at 607 Hammond Bldg., Detroit. Mr. Cornelisen has been with the company for fifteen years. David J. Bowden, formerly of Ashtabula, O., is to join Mr. Cornelisen in handling the business in Detroit and the lower peninsula of Michigan.

The Kolton Electric Mfg. Co., announces the removal of its factory to larger and more modern quarters at 123 New Jersey Railroad Ave., Newark, N. J.

The Graybar Electric Co. announces the appointment of Harvey N. Wood as sales manager of its Philadelphia, Pa., office. Mr. Wood started with the company in 1913, and has been engaged in sales and executive capacities at the Chicago, New York and Philadelphia offices.

The Essex Wire Co., Detroit, Mich., has taken over a 38,000-sq. ft. factory building at Fort Wayne, Ind., that was formerly a section of the Dudlo plant of the General Cable Corp. Herman Arber is to be in charge.

Trade . . . . . Literature . . .

Wire and Cable: Detailed information, graphs and tables covering the characteristics and uses of "U. S." Laytex insulated communication cables, fire alarm and police signal cables, telephone cables, and other wire and cable installations for signal and control service. United States Rubber Products, Inc., New York, N. Y.

Mercury Floodlights: Leaflet with description and data on mercury-incandescent floodlights, especially for filling stations. General Electric Co., Schenectady, N. Y.

Lighting Equipment: A 24-page catalog covering wall lamps, I.E.S. lamps, candlettes, shelf lights, adaptors and other accessories for decorative lighting modernization. LaSalle Lighting Products, Inc., Buffalo, N. Y.

V-Belt Data: Rockwood data books Nos. 782 and 783 are claimed to provide all the information needed to figure or select a Rockwood V-belt drive. Tables deal with power to be transmitted, V-belt cross sections, sheave sizes to use, belt lengths and shaft center distances, horsepower per V-belt, and number of belts required. No. 782 is for drives up to 350-hp., while No. 783 covers single-groove drives up to 1-hp. Rockwood Mfg. Co., Indianapolis, Ind.

Motor Shop Specialties: A complete listing of the Ideal line of products for motor maintenance and repairs is combined with maintenance information and handy electrical tables. Catalog No. 1-936, 68 pages. Ideal Commutator Dresser Co., Sycamore, Ill.

Unit Heaters: Catalog No. 125 describes the Ilg line of unit heater equipment. It contains data for estimating heat requirements, location of units, piping methods and tables, including several pages covering electric unit heaters. Ilg Electric Ventilating Co., Chicago, Ill.

Control and Distribution Products: The Bull Dog current catalog contains 80 pages of condensed information. Safety switches, service equipment, lighting and power panelboards, wiring trough, and other accessories are covered. Bull Dog Electric Products Co., Detroit, Mich.

Fuse Links: Bulletin No. 218 describes and illustrates S & C Universal fuse links for distribution cutouts and includes a technical discussion of the theory and application. Time current curves and coordination charts are given. Schweitzer & Conrad, Inc., Chicago, Ill.

Vibration Control: A general catalog entitled "Isolation" listing anti-vibration products. Also contains data and technical explanations of vibration damping and isolation. The Korfund Co., Inc., Long Island City, N. Y.

Portable Cable: Super Service portable cable applications, construction features, and recommended installation practices are covered in bulletin No. SS2. General Cable Corp., New York, N. Y.

Industrial Lighting: An 8-page bulletin covering the "Triple A" line of Guth Alzak aluminum industrial reflectors made in five types for various lamp sizes. The Edwin F. Guth Co., St. Louis, Mo.

Condensers: Catalog No. 3-C, 84 pages, includes charts, specifications and data covering condensers of the wet and dry electrolytic types; paper and mica capacitors of the tubular, container, fixed and adjustable types; also a description of the capacitor analyzer. Solar Manufacturing Co., New York, N. Y.

Resistors: Catalog No. 7, 8 pages, devoted to wire-wound tubular resistors in 5 to 200-watt ratings, and ranging from 5 to 50,000 ohms. Atlas Resistor Co., New York, N. Y.

Wiremold Chart: A folded chart illustrating Wiremold fittings for use with Nos. 200, 500, 700, 1000, 1100, and 1500 sizes. Chart is 18 in. by 24 in. with all illustrations one-fourth actual size. The Wiremold Co., Hartford, Conn.

Conduit Fittings: The complete Killark line of conduit fittings up to 6-in. size is covered in Catalog No. 12-B. Explosion-proof and vapor-proof fittings, conduit bodies, round fittings, and other accessories are included. Killark Electric Mfg. Co., St. Louis, Mo.

Dry Rectifiers: Booklet B-2078 describing the selection and application of Rectox copper exide rectifiers for supplying d.c. from a.c. source for operating fire alarms, signals, battery charging, etc. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Lighting Catalogue: Lighting Book No. 37L contains 200 pages covering equipment for commercial, industrial and floodlighting requirements. An 8-page section is devoted to an illustrated explanation of "Light for Seeing." General Electric Supply Corp., Bridgeport, Conn.

Motors: Bulletins GEA-1326B, 1341C, 1366A, 1538A, 1619B and 2345 covering totally enclosed fan-cooled, explosion-proof, totally enclosed hoist duty, type K totally enclosed splashproof, and general-purpose squirrel-cage motors, respectively. General Electric Co., Schenectady, N. Y.

Insulating Materials: A listing of insulating tubing, sleeving, varnished cloths, tapes and papers, oiled silk, and various mica products is accompanied by a treatise on the origin of various insulating materials. Catalog No. 11. William Brand & Co., New York, N. Y.

Service Entrance Fittings: A bulletin covering service entrance fittings, entrance ells, ground clamps and accessories. Killark Electric Mfg. Co., St. Louis, Mo.

Ventilating Fans. Bulletin No. 36 covers the "Marvel" line of direct-coupled and V-belted ventilating fans, guards and shutters. Electric Blower Co., Boston, Mass.

Pipe Tools: The complete line of Beaver tools for cutting and threading pipe illustrated and described in catalog No. 37, 40 pages. Beaver Pipe Tools, Inc., Warren, O.

Speed Reducers: Booklet describing single and double reduction units of the single helical gear type for industrial and mining operations. Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

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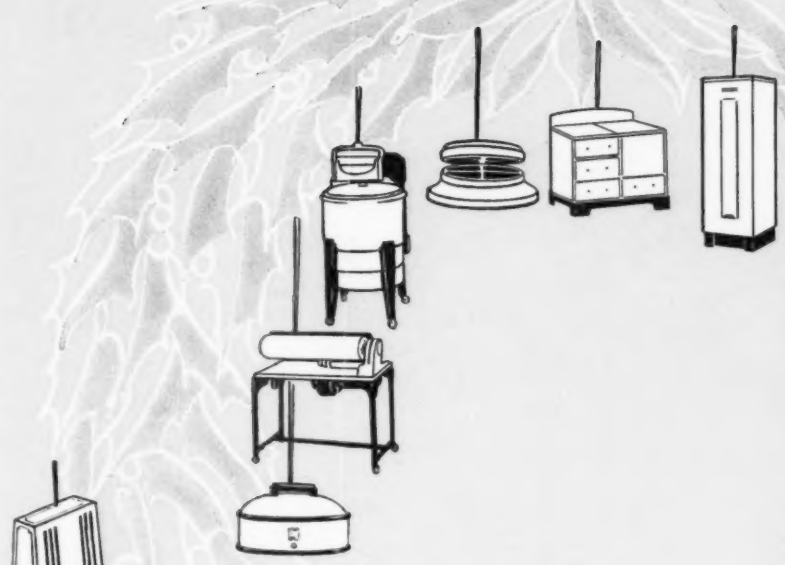

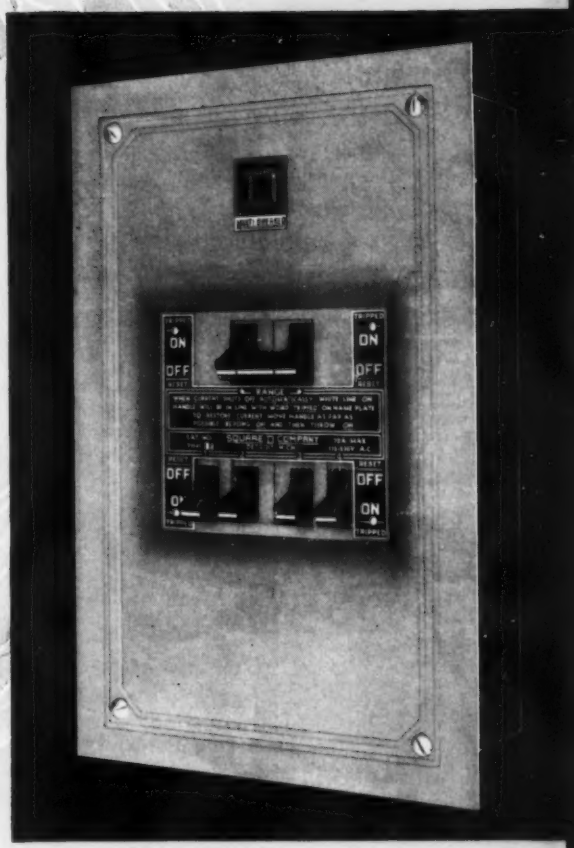

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This advertisement appears in TIME—The Weekly Newsmagazine, December, 28th.

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A TRIP TO THE BASEMENT
OR A FLICK OF THE FINGER?
MULTI-BREAKER
eliminates the necessity of replacing blown fuses...
SQUARE D COMPANY

■ Follow up your Christmas appliance sales with an active re-wiring campaign and use the Square D Multi-breakeR as your main sales talking point. Major appliances will require new house wiring—smaller appliances suggest overloaded circuits and blown fuses, especially in inadequately wired homes.

The Multi-breakeR has more customer-appeal than most of the electrical conveniences which you have been selling. And it brings you a wiring job, as well as a good profit.

The Multi-breakeR is sure protection against overloaded circuits. It eliminates the cost, inconvenience and fear of changing fuses. The flick of a handle restores the circuit. For installations up to six circuits, it is used as the main service entrance as well as branch circuit protection and switching—you need no meter switch. Your customers will gladly pay the small additional cost. Ask your Square D distributor about the attractive counter display and Multi-breakeR literature. They will help you procure new wiring jobs.

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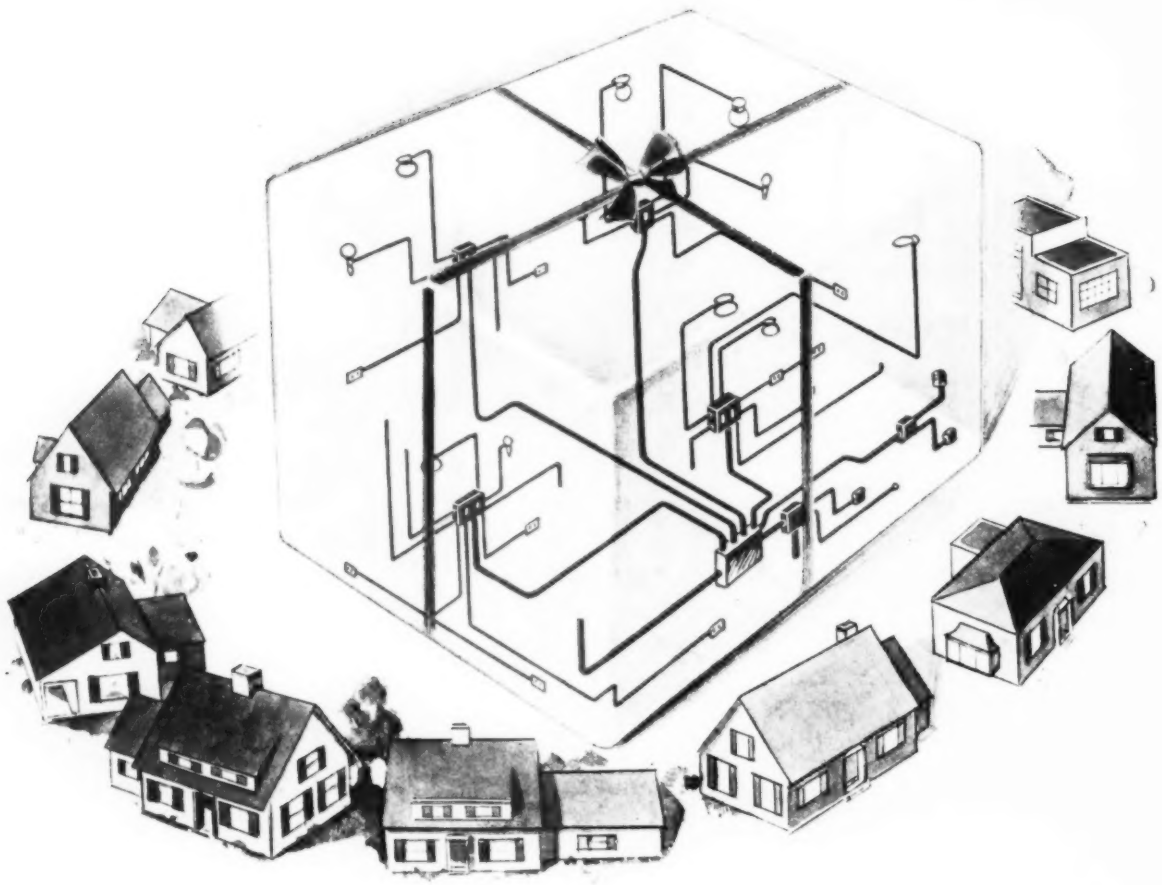

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How often have you had to cut home wiring to the bone because customers couldn't grasp the need for the proper number of outlets, switches, etc.? You've had the trouble an automobile salesman would have if he tried to sell the individual parts of a car one by one instead of a complete car.

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See the nearest G-E Merchandise distributor or write to Section CDW-6812, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn. for further information about the G-E Radial Wiring System and how it can help you to sell adequate wiring jobs.

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